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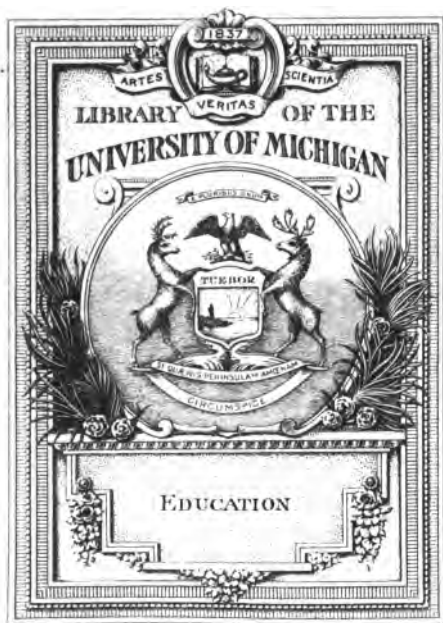
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**COMMERCIAL TESTS AND
HOW TO USE THEM**

SCHOOL EFFICIENCY MONOGRAPHS

Anderson

Education of Defectives in the Public Schools

Arp

Rural Education and the Consolidated School

Butterworth

Problems in State High School Finance

Cady

Commercial Tests and How to Use Them

Eaton

Record Forms for Vocational Schools

McAndrew

The Public and Its School

Mayhew

Standards in English

Mead

An Experiment in the Fundamentals

Pearson

The Reconstructed School

Reed

Newsboy Service

Styman

The Teaching of Spelling

SCHOOL EFFICIENCY MONOGRAPHS

COMMERCIAL TESTS AND HOW TO USE THEM

BY

SHERWIN CODY

MANAGING DIRECTOR

BUSINESS STANDARDS ASSOCIATION



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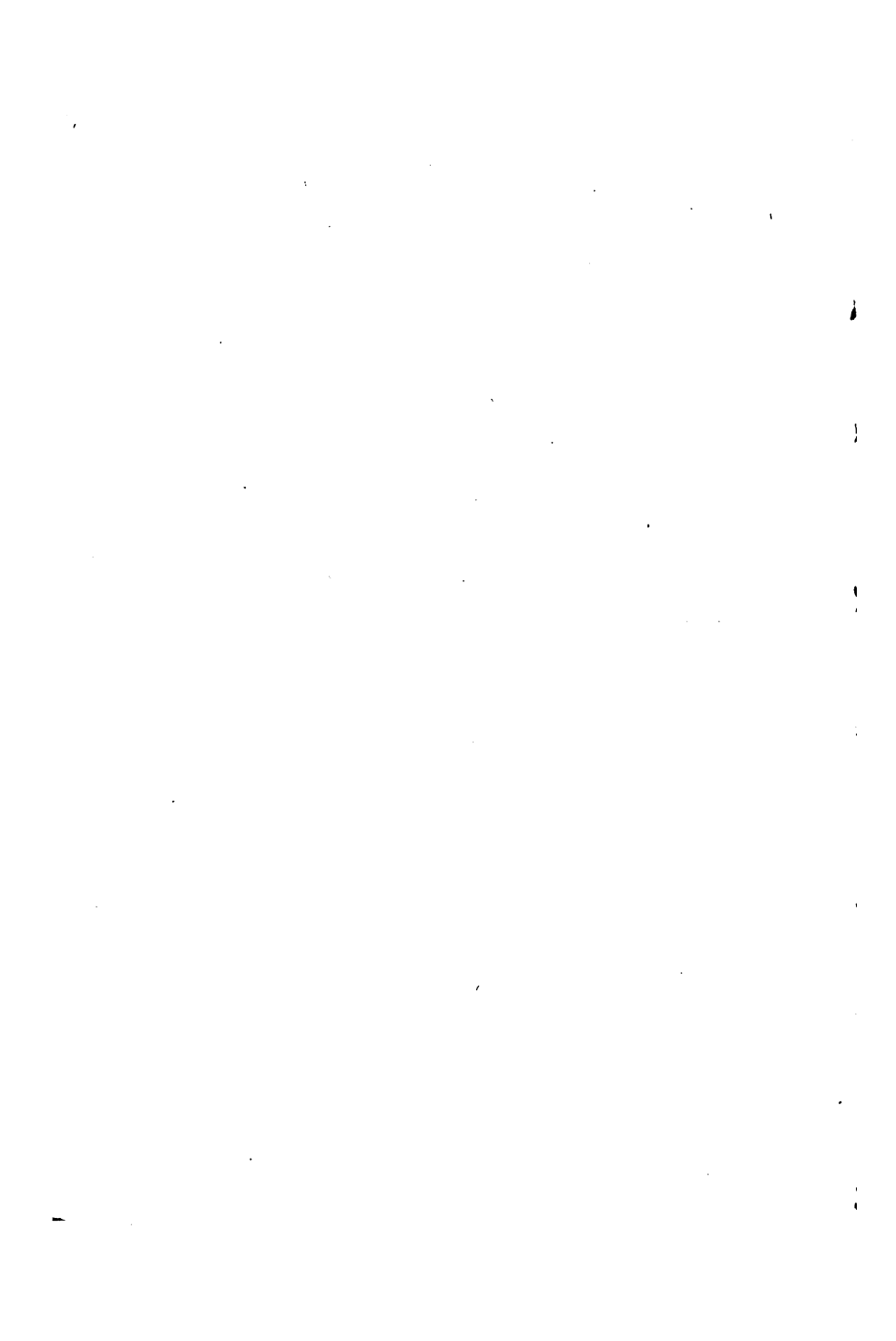
CONTENTS

PART ONE — A DISCUSSION OF THE PROBLEM

CHAPTER	PAGE
I. THE SCHOOLS AND BUSINESS EMPLOYMENT.....	1
II. THE NATIONAL BUSINESS ABILITY TESTS.....	10
III. THE PRINCIPLES OF SCIENTIFIC TESTS.....	21
IV. THE NATIONAL TESTS IN THE CLASSROOM.....	43

PART TWO — THE TESTS

V. TWO SERIES OF THE NATIONAL BUSINESS ABILITY TESTS.....	56
VI. MEASURING CLASSES AND TEACHERS	175
APPENDIX.....	201
INDEX.....	215



PART ONE—A DISCUSSION OF THE PROBLEM

I

THE SCHOOLS AND BUSINESS EMPLOYMENT

DEFECTIVE PREPARATION OF STUDENTS

THE PROBLEM CONSIDERED IN CHICAGO

IN 1912, the author, then a member of the committee on education of the Chicago City Club, brought about the organization of a special joint committee of the Chicago Association of Commerce and the Board of Education. For a number of weeks this committee met every Thursday at the Union League Club, and it made a report in January, 1913. The business men made bitter criticisms of the schools, and the educators resented these criticisms as unjust. The fact is that the training which our schools give to the young people who enter business is seriously lacking in something. What is it? The New York Chamber of Commerce answers effectively in its report of June 27, 1917:

REPORT OF NEW YORK CHAMBER OF COMMERCE

“Your committee first directed its studies to the public commercial high schools and their product, and while in the progress of this work it found many things where it believed improvement could and should be made, it was soon forced to the conclusion that higher education, to be valuable and effective, must be based upon sound and thorough elementary education, and there was ample evidence of weakness in this direction.

COMMERCIAL TESTS AND HOW TO USE THEM

"Your committee's inquiries, both among the teachers of the commercial schools and among those employers who desire to employ their product, disclosed a widespread opinion that the charge of general inefficiency among the graduates is not without foundation; that a *large proportion of them are deficient in practical working knowledge of fundamental subjects such as reading, writing, spelling, and grammatical construction of the English language, and arithmetic and geography*; that the education consists largely of a smattering of superficial knowledge *without the power of clear, definite thought and expression, and that they lack an appreciation of thoroughness, exactness, earnestness, and perseverance as factors in business success.*"

NEEDS OF HIGH SCHOOLS AND OF BUSINESS THE SAME

The New York Chamber of Commerce in speaking for the business world does not ask for any technical commercial training whatsoever, but simply asks for more efficiency in the regular work of the elementary schools. The high schools feel this need as well as do the business men. The preparation that is needed for business is very much the same as that which is needed to carry on the high-school studies. The business men cry out; the high schools are more quiet and patient, but are none the less sufferers. Both business men and high-school authorities ask that the standard of accuracy be raised for common operations. This can be done only by measurement and competition, and above all by the use of a single national standard.

Under the direction of the Superintendent a year or two ago a short test in arithmetic was given to students entering the New York high schools. The examiner said that he himself was able to solve all the problems in six minutes.

THE SCHOOLS AND BUSINESS EMPLOYMENT

Pupils were allowed forty minutes, yet it is reported that only 60 per cent of those who took the examination were able to pass it on a 60 per cent basis. In a district where two superintendents had been giving standardized tests, 72 per cent passed. *The conclusion was that the competition of tests was useful to stimulate pupils to do better work.*

The dean of freshmen of the New York Manual Training High School has stated that 60 per cent of the young people who enter that school drop out during the first year. Evidently they are unprepared to meet the severer requirements of the high schools and wilt under the work they are obliged to face.

Standard tests and short, intensive periods of hard work to prepare for those tests would tend to develop in students a hardness of fiber that would keep a larger percentage of them in school.

PREPARATION OF GENERAL CLERKS

In his report on commercial education in New York City,¹ Frank V. Thompson pointed out to the Board of Estimate and Control that among commercial employees, including sales clerks, only 15 per cent were stenographers or bookkeepers, while 85 per cent were in effect unrecognized in our system of commercial training. A survey made by the Cleveland Foundation showed that out of 2000 positions for young men listed at the Cleveland Y. M. C. A., 8 per cent were for stenographers, 10 per cent for bookkeepers, and 78 per cent for office boys and general clerks. More than half the girls who enter upon

¹ Reprinted as *Commercial Education in Public Secondary Schools*, in School Efficiency Series, edited by Professor Paul H. Hanus and published by World Book Company. Mr. Thompson is now superintendent of schools in Boston.

COMMERCIAL TESTS AND HOW TO USE THEM

office work become stenographers; but this does not take into consideration the vast number of women sales clerks. We may be sure that 75 per cent of all commercial employees are general clerks, who have had no special training, little help in getting positions except through private employment agencies, and no recognizable rating of any sort among business men.

As large numbers of those who become office boys and general clerks leave school at the end of the seventh, eighth, or ninth grades, their training should necessarily be chiefly on the fundamentals of English and arithmetic, which are the principal technical tools that they will need in business. It is largely from the general clerks who start as office boys that the business executives who control our industry and commerce are developed.

If standard tests on accuracy and speed in handling the common fundamentals could be used in schools and made the basis for an Efficiency Employment Register of those who leave school from any grade or year to go to work, these 75 per cent of office boys and general clerks would at last get something from the schools worth having in a vocational way, and the academic students going on through high school and college would be none the worse for the stimulation toward greater accuracy.

HOW BUSINESS MEN JUDGE APPLICANTS FOR OFFICE POSITIONS

In judging an applicant, the trained business man gets very important information through that first swift look which takes in dress, physical proportions, and the moral qualities of the applicant as they are stamped on his face.

The applicant is usually required to fill out an application blank. In the best-organized business houses these blanks are coming to be quite complicated affairs.

THE SCHOOLS AND BUSINESS EMPLOYMENT

A glance at the application blank shows penmanship, often it shows spelling, and in particular it shows power of mind and judgment in making answers. All these abilities are judged roughly. The very poor are immediately eliminated; but there is no very good way to distinguish between the persons worth say \$6, and \$8, and \$10 a week, since the test of the application blank is practical rather than scientific.

After these two tests — appearance and the written application — the business man at present falls back on trial and observation under working conditions. The constant shifting of employees is evidence that the two usual tests serve their purpose very imperfectly.

COST OF CHANGING HELP

If the employer knew the different combinations of ability in applicants, he could avoid changing help as often as he does. The cost of changing help in offices has not been accurately investigated; but careful figures compiled by a well-known firm of automobile makers show the cost of replacing a skilled mechanic to be over \$80. First, there is the cost of finding the man and putting him on the pay-roll. Then, there is the cost of teaching him the special requirements of the particular position. It takes him a couple of weeks to learn where things are, and just what is wanted of him. When everything is taken into consideration, \$80 seems a moderate estimate of the cost of changing an employee.

EFFICIENCY INCREASED BY STANDARD MEASUREMENTS

The efficiency of most office forces remains distinctly below what it ought to be. Some office forces are very superior, and some are very inferior, but no employer really knows how his force compares with others.

COMMERCIAL TESTS AND HOW TO USE THEM

A general use of standard measurements would undoubtedly reduce the turnover of office employees as much as 25 per cent, and so save thousands of dollars to employers. The efficiency of the office force could also be materially raised by the elimination of those below grade, who now dilute practically every collection of office employees.

In times of shortage (war times, for example) our Efficiency Employment Register of those leaving school to go to work would make it possible to control and use the available supply so as to save a waste in distribution from present haphazard methods which, if estimated at 25 per cent, would in effect add 500,000 employees to the 2,000,000 who now leave school annually in the United States to go to work.

ACCURACY ON FUNDAMENTALS AS VOCATIONAL EQUIPMENT

The proper vocational equipment for three fourths of all commercial employees is accuracy and speed in handling figures, and correctness in spelling, punctuating, reproducing instructions, and composing letters.

All who go to the public schools study the fundamental subjects. What is wanted for business is a superior degree of mastery of such parts of them as will be used. How can these fundamental subjects be handled so as to give them a true vocational character? The answer is plain, — by measuring speed and accuracy in such a way that employers will award positions partly on the records of such measurements. The thing to do is to establish standards of measurement, and to issue a national employment list that will record the measurements and make them available to employers.

THE SCHOOLS AND BUSINESS EMPLOYMENT

COÖPERATION BETWEEN EDUCATORS AND BUSINESS MEN

It has been suggested that business men ought to take hold of our commercial schools and have such tests of ability to perform common operations in the business office substituted for the ordinary academic examinations. Part of the trouble is that educators know only in a general way what business men want. Quite as important is the fact that business men themselves know only in a general way what it is that they want. Neither side has analyzed the situation thoroughly.

The author has long felt that the greatest need of commercial education is the hearty coöperation of business men and educators. While a member of the Committee on Education of the Chicago City Club, he conceived that this might be brought about by having the business men formulate standards of ability to perform common operations in the business office. These standards were to form the basis of tests on which the business men would be willing in part to base employment of graduates of the public schools, and which educators might use as a guide in training their pupils.

Experience has shown that it is troublesome and difficult to give tests to applicants in the hurry of employing them, especially when help is scarce and practically all who apply must be employed. What business men want is to have tests given in schools, or they want public tests so that they can call for the records and see at a glance the measure of an applicant's ability.

EFFECTS OF MEASUREMENT

The establishment of tests as part of the basis of employment, as tests are now part of the basis of employment in the civil service, will mobilize the forces of em-

COMMERCIAL TESTS AND HOW TO USE THEM

ployment behind the public schools and no doubt will raise the standard of the pupils. The ability of the office boy and the general clerk will immediately become a marketable commodity; the business man will know what he is getting; the young person of superior ability will secure prompt and intelligent recognition, whether or not he possesses the self-advertising qualities that now have so much weight with employers.

A GRADED SCALE OF WAGES

The almost inevitable effect of this measurement of fundamental ability will be the end of the present system of level pay for all beginners. As soon as employers begin to compete for the best talents, they will pay more for the good help, and less for the poor; and where pupils are now satisfied with mere 60 or 70 per cent passing marks, they will then try to make the highest possible grades, since their ratings will make a difference in the pay at which they will be able to start to work.

No business man, by looking at a boy or girl, or even by examining an application blank, can distinguish the person capable of getting 202 figures in the answers of a nine-minute arithmetic test with only one error, or the one getting 42 figures in nine minutes with 5 errors. Yet the arithmetic tests of 280 boys and girls graduating from one school district in New York would instantly show these actual records. By looking at the spelling of words on an application blank, a business man might pick out the boy who on a test misspelled 24 words out of 50 common, easy terms; but he probably would see no difference between the boy who missed 7 words out of 50 and was really a poor speller, and the one who missed none at all. The business man may distinguish between the stenographer who can transcribe 15 words a minute

THE SCHOOLS AND BUSINESS EMPLOYMENT

with seven errors per hundred words and the one who can transcribe 57 words a minute with one error per hundred words; but he will see little difference between the girl who transcribes 25 words a minute with three errors, and the one who transcribes 37 words a minute with one error. He will probably pay both the same wages, whereas if the first one is worth \$12 a week, the second is worth \$18 a week. It is very unwise to pay both \$15 a week, as is usually done.

Many employers have been discouraged by the seeming indisposition of their employees to prepare themselves for higher positions. There can be no doubt that the substitution of definite conditions of promotion for vague promises will banish suspicions of favoritism and induce employees to strive for advancement.

Give prospective employees in schools, and candidates for promotion in business, something definite to work at in order to obtain the higher-grade positions, and they will promptly respond.

II

THE NATIONAL BUSINESS ABILITY TESTS

THE ORGANIZATION OF A NATIONAL COMMITTEE

INCORPORATION

WITH a view to promoting efficiency both in schools and in business offices, a national committee was organized in 1913. It was the direct outgrowth of the meetings of the special joint committee of the Chicago Association of Commerce and the Board of Education. The committee consists one third of educators and two thirds of persons in business, with a large number equally interested in business and education, and with as many members as possible representing other national organizations that would naturally cooperate. This committee was incorporated under the laws of Illinois as the National Associated Schools of Scientific Business.¹ It was not organized for profit directly or indirectly. The present officers are ex-Governor W. N. Ferris, president; Gerald B. Wadsworth, advertising expert with A. W. Shaw Co., New York, vice-president; Joseph Cummins, of Chicago, attorney and treasurer; and Sherwin Cody, of Chicago and New York, managing director and secretary. On the board of trustees are Frank V. Thompson, superintendent of schools in Boston, one of the leading experts in the country on high-school commercial education; W. D. Lewis, principal of the William Penn High School in Philadelphia; B. F. Williams, president of the National Association of Accredited Schools, the strongest private business colleges in the country; E. A. Rumely, whose Interlaken School was a notable American educational experiment; A. S. Hall, principal of the Medill High School, Chicago; Mrs. Anne F. Hickman, head of

[10] ¹ Name changed to Business Standards Association, 1919.

THE NATIONAL BUSINESS ABILITY TESTS

the stenographic department, Hume-Fogg High School, Nashville, Tennessee. Altogether, the committee includes some of the leading commercial educators of the country. On the business side among the trustees are Col. C. A. Carlisle, of South Bend, long advertising manager of the Studebaker Corporation, and an independent system expert, and Herbert M. Temple, public accountant, St. Paul. During its working period the committee included E. H. McCullough, of Chicago, the efficient secretary of the National Implement and Vehicle Association; Waldron O. Rand, of Boston, chairman of the educational committee of the American Association of Public Accountants, which has long had a deep interest in commercial education; Dr. Katherine M. H. Blackford, now of New York, who attained national reputation as an employment expert with Harrington Emerson; C. A. Prosser, former secretary of the National Association for the Promotion of Industrial Education, now director of the Federal Board of Vocational Education, who was elected at the suggestion of Secretary Redfield; H. Walton Heegstra, advertising expert, Chicago; and Paul Mandeville, wholesale produce merchant, Chicago. These have recently been replaced by E. St. Elmo Lewis, Detroit and New York; C. R. Hebble, executive secretary Cincinnati Chamber of Commerce; W. M. Jackson, formerly employment manager of the National City Bank of New York; and David M. Roth, memory expert and chairman of the "Schools—miscellaneous" section of the National Association of Rotary Clubs.

EARLIER TESTS

This committee found in use two types of tests, (1) pure psychological tests such as the Binet-Simon tests or the tests since adopted for use with the United States Army,

COMMERCIAL TESTS AND HOW TO USE THEM

and the tests devised by Professors Thorndike and Scott for the employment department of the Metropolitan Life Insurance Company; and (2) standardized educational tests used in school surveys, in the employment departments of the National Cloak & Suit Company, the Curtis Publishing Company, and the Western Union Telegraph Company. The Courtis Tests in Arithmetic are fairly representative of these.

DEVISING NEW TESTS

The committee concentrated its attention on developing and trying out a series of elementary tests of ability to perform common operations in the business office. The purpose was to measure speed and accuracy, and also to determine the fundamental education which all office employment presupposes. A series of tests devised and printed in June, 1914, was tried by the employment managers of the National Cloak & Suit Company, the National Cash Register Company, the Burroughs Adding Machine Company, the Commonwealth Edison Company, Swift and Company, and (in a limited way) Marshall Field and Company.

These trials were made to determine what tests were practical, how long the tests needed to be, and what different kinds of tests were required. As a result, 20 short, simple tests were devised, and these met with the unanimous approval of the employment managers of the houses that coöperated in the experiment. They were adapted to examining in about an hour's time the following classes of office employees on the points indicated:

1. Office boys and girls. Fundamental education in adding, spelling, and writing a letter of application according to definite instructions; a test to show mental alert-

THE NATIONAL BUSINESS ABILITY TESTS

ness; and a test to show power to concentrate the mind on business instructions and to reproduce them.

2. General clerks, 16 years of age and older. Reproduction of instructions; clerical accuracy in filling out blanks, such as a retail-store invoice; speed and accuracy in handling fractions by short-cut methods, and percentage; copying addresses and arranging them alphabetically; writing a letter of application as directed.

3. Stenographers of lowest grade. Reproduction; advanced spelling; elementary punctuation; copying a typewritten blank for mimeographing; taking a dictated letter in shorthand at 100 words a minute and transcribing; writing a full letter of application.

4. Stenographers of secretarial class or beginning correspondents. Reproduction; full test on grammar and punctuation; advanced spelling; taking dictated letter and transcribing; composing three original letters in reply to inquiries referring to four pages of Wanamaker's catalogue. In this last test, the sheets from the catalogue were furnished in advance to the persons examined. The purpose was to see if they would notice that you cannot ship shoes without knowing the size desired, and that questions may be answered from the illustrations; whether they would use tact and patience in dealing with customers on trifling matters; and whether they could compose and punctuate letters in good style.

5. Bookkeeping clerks. Speed and accuracy in arithmetic; clerical accuracy in handling checks, notes, money-order applications, bank-deposit slips, and invoice forms; copying addresses and alphabetizing. There were no technical questions on bookkeeping theory, because modern systems of bookkeeping are not generally taught in schools, and because to employers the important point is to get men of good material whom they can train.

COMMERCIAL TESTS AND HOW TO USE THEM

BULLETIN NO. 1

Twenty of these tests, revised and shortened, were published on March 20, 1915, in a 24-page pamphlet designated as "Bulletin No. 1." The revision resulted from suggestions made by a number of employment managers, and from a study of the tests used by the Metropolitan Life Insurance Company, the National Cloak & Suit Company, and the Curtis Publishing Company. At the same time the United States Bureau of Education sent out its Vocational Letter No. 5, which contained a report of the investigation and included an offer to furnish the tests on request. This report was printed in full in the *New York Times* and many other newspapers. In response to requests, Bulletin No. 1 was widely distributed, particularly to schools, by the United States Bureau of Education.

TRYING THE NATIONAL TESTS

The next great problem was to develop a quick and easy way of grading and checking the tests, and to arrive at standards that would indicate what grades ought to be made and how they should be interpreted. The constant purpose was to eliminate the variable element of personal judgment.

Dr. George D. Strayer, of Teachers College, Columbia University, head of the Commission on Tests of the United States Bureau of Education, laid down the general principles for grading and judging the tests. He approved the plan that was finally worked out and actually applied in 4169 separate experimental tests which were given to about 500 individuals through the courtesy of the following business houses and institutions:

Marshall Field and Company; Swift and Company;

THE NATIONAL BUSINESS ABILITY TESTS

Commonwealth Edison Company; Sears, Roebuck and Company; National Cash Register Company; Burroughs Adding Machine Company; Bureau of Credits, Detroit; National Cloak & Suit Company; Filene's, Boston; Boston Clerical High School; Cincinnati Chamber of Commerce (open, public test, mostly of high-school graduates); Chamber of Commerce, and Spencerian Business College, Newburgh, New York; Holyoke (Massachusetts) High School; Walla Walla (Washington) High School; Y. M. C. A., Chicago (prize competition open to grammar and high-school graduates, 150 entries); Wendell Phillips High School, Chicago (one test); Central School, Troy, New York (under inspection of committee of business men).

THE PERSONS TESTED

The persons who took the tests were carefully selected as representatives of the special classes whose ability it was desired to standardize. The averages that were made are therefore very nearly typical for different parts of the country and probably for the country as a whole. They represent, however, the higher level.

RESULTS OF THE TESTS

The first test given in the office of the Burroughs Adding Machine Company was on spelling. A young woman who was working nights to become a dictaphone operator made an average of 59 per cent. It was instantly apparent that she could never succeed in writing letters from the dictaphone unless she first learned to spell, and that she and the company were wasting time. In another case the clerks in a bookkeeping department were shown to be distinctly below grade as a whole, due perhaps to an erroneous standard of employment.

COMMERCIAL TESTS AND HOW TO USE THEM

It seems that in every business house there are intelligent-looking persons who were hired because they appeared satisfactory and were agreeable, but whose capacities are far below the average. For example, in a bookkeeping department one person showed averages as follows, compared with the averages of the records of the department (his included) :

Individual: Reproduction poor; business papers, 44 per cent; bookkeeping accuracy, 36 per cent; fractions, speed 17, errors 11.

Department: Reproduction fair; business papers, 75 per cent; bookkeeping accuracy, 73 per cent; fractions, speed 36, errors 5.

In a very high-grade stenographic department, one girl alone showed the following comparison :

Individual: Words per minute 15; errors 7.

Department: Words per minute 49; errors 2.

Another individual: Words per minute 57; errors none.

In a high school which was at the head of the list on the bookkeeping and figuring tests, 18 stenographers out of 30 fell below the standard minimum of 35 words a minute in transcribing shorthand notes, and those 18 averaged 12 words a minute. One high school had a single stenographer, out of 20, who was able to make 35 words a minute; while in another school only 5 out of 19 were not above 35. In still another high school none reached the 35-word minimum.

It seems likely, though the tests were not given widely enough to prove it, that superiorities and weaknesses may be shown for different cities. Grammar-school graduates in one city showed a knowledge of elementary applied grammar that might be represented by 16 per cent. In general, however, not one grammar-school graduate in ten seems to have any knowledge whatever

THE NATIONAL BUSINESS ABILITY TESTS

of grammar as applied in choosing the right form when the right and wrong are given on points of universal application, as in the test on page 114.

It appears that correspondence is taught in schools chiefly as a matter of the form of the letter. In one high-grade correspondence department in a business house, the average rating on getting the facts right (on a scale of 5) was 4, or good. Among order writers and similar clerks in another department of the same concern, the average on facts was good, $3\frac{1}{2}$; in the local high school the average was poor, $2\frac{1}{2}$. Tact among the business correspondents was good, 4; among the general clerks good, $3\frac{1}{2}$; and in the schools poor, $1\frac{1}{2}$. Among the business correspondents, form and correctness in English were excellent, 5; among the general clerks fair, 3; and among the schools good, 4 plus.

In most subjects, however, high-school graduates are generally well up to business employees of experience; they are above them in some subjects, but are inferior in accuracy.

Another curious fact was that in general only college graduates were able to make a grade on grammar approaching 100 per cent (no rules, definitions, or analyses were required; only common examples of wrong form and right form were given). Ability to punctuate ran distinctly below knowledge of grammar, except in one office where the stenographers were of especially high grade.

The standard of accuracy in modern touch typewriting was shown to be singularly high. Scores of letters had scarcely a mis-touched key.

BULLETINS NOS. 2, 3, AND 4

The third edition of the National Business Ability Tests was published in January, 1916, as Bulletin No. 2.

COMMERCIAL TESTS AND HOW TO USE THEM

The issue is accompanied by a Key and a uniform system of grading, suggested by Dr. Strayer. It gives a further revised and perfected version of the same tests. On the record blank are shown, side by side with individual markings, the averages for grammar-school graduates, graduates of the commercial departments of high schools, and experienced employees, chiefly of the class of stenographers and bookkeepers. These may fairly be accepted as standard minimums. Also there are recorded the averages of the five highest (fairer than the one highest, who might be a genius or a special expert). The good employee or student ought to have a record somewhere between these two, and the business man who looks over the individual record will have just what he needs for comparison.

Bulletins No. 3 and No. 4 provide a second and a third parallel series of tests.

Fresh tests, closely parallel though different, are being prepared at intervals, so that secret tests of the same value as the model tests will always be available for use by various institutions. The tests have been shortened, although the proportionate ratings have been pretty closely preserved, and they can be given in 2 to 18 minutes. All the tests for any one applicant, as a stenographer tested on 9 points, can be given in about an hour and graded in 10 to 15 minutes. Any good clerk can easily learn to give the tests, and also to grade them by the Key.

THE 100 PER CENT STANDARD

In such work as figuring, spelling, typewriter operation, filling out business papers, filing, and copying, the business world demands approximately a 100 per cent standard of accuracy, while the schools have a 60 or 70 per cent standard, which is appropriate enough to such

THE NATIONAL BUSINESS ABILITY TESTS

subjects as Latin and Greek, where the 100 per cent standard is impossible. The National Business Ability Tests, if they can be generally established in offices and schools, will undoubtedly stimulate schools to adopt the 100 per cent standard in certain subjects, as in spelling. Leonard Ayres, of the Russell Sage Foundation, listed 23,000 words taken at random from 2000 business and professional letters and found that seven eighths of them could be included in a list of 542, less than half of which were likely to give trouble in spelling. Obviously schools can teach most pupils to spell correctly every one of those words. R. C. Eldredge, a factory manager in Niagara Falls, New York, classified all the words in 270 newspaper articles by 200 different writers and found a total of 6002. Some of these words were special and used but once, many were common and easy, and about 1200 might have required spelling drill. Even the 1200 may be mastered practically to the 100 per cent point if pupils will concentrate on them. Professor W. Franklin Jones, of the University of South Dakota, carried out an even larger experiment, listing some 15,000,000 words of composition. He found that all the words used more than once numbered 4532, of which about 1000 might require special concentrated spelling drill. If the words that are always being misspelled can be mastered by every one, most of our spelling trouble will disappear. If the National Spelling Tests are taken from a known list of 1000, those who wish to pass the tests and get employment will master practically all of them.

Whether the common principles of punctuation and grammar can be compressed into a few pages of drill that can be mastered to the 100 per cent point, remains to be shown. But if any expedient will secure this

COMMERCIAL TESTS AND HOW TO USE THEM

concentration on just what the business men require, it is the establishment of national tests.

Of course this narrow, specialized proficiency is a good thing only within limits. The broad power to think in a clear, businesslike way is far more important and is more difficult to develop; but schools ought at least to abandon teaching merely the external forms of letter writing and give some attention to putting accuracy, tact, and good feeling into letters.

III

THE PRINCIPLES OF SCIENTIFIC TESTS

PSYCHOLOGICAL INTELLIGENCE TESTS

THE Binet-Simon intelligence tests are a series of questions on common things of universal knowledge which tend to show how the mind of the person tested functions in following the directions given, or deducing one thing from another, or detecting correspondences. These have been given to many thousands of persons of average ability until it has been determined what record would be made on the average by a normal person 8 years old, 10 years old, 12 years old, 14 years old, etc.

In the United States this French scale has been used in city psychological laboratories for detecting persons abnormally deficient in intelligence, or morons. But the principle has been widely developed with different types of tests, such as writing the opposites of a list of words, drawing lines on pictures in accordance with exact and peculiar directions, or choosing a fact that corresponds to a word, as in :

A cat is useful because it

1. catches mice.
2. is gentle.
3. has soft fur.

Of course its usefulness corresponds to the first fact.

The most far-reaching practical use of psychological intelligence tests is that which has been made by the personnel department of the United States Army. To supply a quick basis for selecting officers, making special assignments, etc., etc., more than a million soldiers have been tested under the direction of Major Yerkes in the Surgeon-General's office, with a series of eight different

COMMERCIAL TESTS AND HOW TO USE THEM

types of psychological tests printed in a book and arranged for checking or marking in a simple way, and quickly scored by applying a celluloid stencil on which the correct answers are indicated by a dot and can be counted up with astonishing rapidity and accuracy.

The eight tests are of the following types, and this list shows the number of questions or points in each type :

ALPHA SERIES¹

1. Hard Directions, 12 points.

(Placing marks in geometrical figures according to directions.)

2. Arithmetic statement problems, 20 points.

(Beginning with easy ones and becoming progressively more difficult.)

3. Reasoning Test, 16 points.

(Choosing the true statement out of three given.)

4. Like — opposite, 40 points.

(Underscore the word *like* or *opposite* according to which is true.)

5. True — false, 24 points.

(Words of sentence are jumbled and must first be rearranged mentally, and then word *true* or *false* is underscored according to which is correct.)

6. Continuing series of numbers (two additions to each series), 20 points.

7. Mixed Relations Test, 40 points.

(In the form of an arithmetical proportion, to supply the fourth term from several words given.)

8. Completion and Information Test, 40 points.

(Choosing a word from several given that will complete the sentence properly, and also indicate general information.)

Total, 212 points.

¹ Similar to Otis Group Intelligence Scale, published by World Book Co.

THE PRINCIPLES OF SCIENTIFIC TESTS

The following account of these tests is from the official "Personnel Manual," Chapter X, edition of October, 1918.

THE UNITED STATES ARMY INTELLIGENCE TESTS

The tests were prepared by a special committee of the American Psychological Association. Before being ordered into general use they were thoroughly tried out in four National Army cantonments, and from time to time have undergone revision to increase their practical usefulness. Between May 1st and October 1st, 1918, approximately one million three hundred thousand men were tested.

Three systems of test are now in use :

(1) *Alpha*. This is a group test for men who read and write English. It requires only fifty minutes, and can be given to groups as large as 500. The test material is so arranged that each of its 212 questions may be answered without writing, merely by underlining, crossing out, or checking. The papers are later scored by means of stencils, so that nothing is left to the personal judgment of those who do the scoring. The mental rating which results is therefore wholly objective.

(2) *Beta*. This is a group test for foreigners and illiterates. It may be given to groups of from 75 to 300 and requires approximately fifty minutes. Success in Beta does not depend upon knowledge of English, as the instructions are given entirely by pantomime and demonstration. Like Alpha, it measures general intelligence, but does so through the use of concrete or picture material instead of by the use of printed language. It is also scored by stencils and yields an objective rating.

(3) *Individual Tests*. Three forms of individual tests are used : The Yerkes-Bridges Point Scale, the Stanford-

COMMERCIAL TESTS AND HOW TO USE THEM

Binet Scale, and the Performance Scale. An individual test requires from fifteen to thirty minutes. The instructions for the Performance Scale are given by means of gestures and demonstration, and a high score may be earned in it by an intelligent recruit who does not know a word of English.

All enlisted men are given either Alpha or Beta according to their degree of literacy. Those who fail in Alpha are given Beta, and those who fail to pass Test Beta are given an individual test.

As a result of the tests, each man is rated as A, B, C+, C, C-, D, D-, or E.

The psychological staff in a camp is ordinarily able to test 2000 men per day and to report the ratings to the Personnel Office within 24 hours.

Explanation of Letter Ratings. The rating a man earns furnishes a fairly reliable index of his *ability to learn, to think quickly and accurately, to analyze a situation, to maintain a state of mental alertness, and to comprehend and follow instructions.* The score is little influenced by schooling. Some of the highest records have been made by men who had never completed the eighth grade. The meaning of the letter ratings is as follows:

A. *Very Superior Intelligence.* This grade is earned by only four or five soldiers out of a hundred. The A group is composed of men of marked intellectuality. "A" men are of high officer type when they are also endowed with leadership and other necessary qualities.

B. *Superior Intelligence.* "B" intelligence is superior, but less exceptional than that represented by "A." The rating "B" is obtained by eight to ten soldiers out of a hundred. The group contains a good many men of the commissioned officer type and a large amount of non-commissioned officer material.

THE PRINCIPLES OF SCIENTIFIC TESTS

C+. High Average Intelligence. This group includes about 15 to 18 per cent of all soldiers and contains a large amount of non-commissioned-officer material, with occasionally a man whose leadership and power to command fit him for commissioned rank.

C. Average Intelligence. Includes about 25 per cent of soldiers. Excellent private type, with a certain amount of fair non-commissioned-officer material.

C-. Low Average Intelligence. Includes about 20 per cent. While below average in intelligence, "C-" men are usually good privates and satisfactory in work of routine nature.

D. Inferior Intelligence. Includes about 15 per cent of soldiers. "D" men are likely to be fair soldiers, but are usually slow in learning and rarely go above the rank of private. They are short on initiative and so require more than the usual amount of supervision. Many of them are illiterate or foreign.

D- and E. Very Inferior Intelligence. This group is divided into two classes: (1) "D-" men, who are very inferior in intelligence but are considered fit for regular service; and (2) "E" men, those whose mental inferiority justifies their recommendation for Development Battalion, special service organization, rejection, or discharge. The majority of "D-" and "E" men are below ten years in "mental age."

The immense contrast between A and D- intelligence is shown by the fact that men of A intelligence have the ability to make a superior record in college or university, while D- men are of such inferior mentality that they are rarely able to go beyond the third or fourth grade of the elementary school, however long they attend. In fact, most D- and E men are below the "mental age" of 10 years and at best are on the border-line of mental

COMMERCIAL TESTS AND HOW TO USE THEM

deficiency. Most of them are of the "moron" grade of feeble-mindedness. B intelligence is capable of making an average record in college, C+ intelligence cannot do so well, while mentality of the C grade is rarely equal to high-school graduation.

Evidence that the Tests Measure Military Value. It has been thoroughly demonstrated that the intelligence ratings are very useful in indicating practical military value. The following investigations are typical:

1. Commanding officers of ten different organizations representing various arms in a camp were asked to designate:

- (a) The most efficient men in the organization;
- (b) Men of average value;
- (c) Men so inferior that they were "barely able" to perform their duties.

The officers of these organizations had been with their men from six to twelve months and knew them exceptionally well. The total number of men rated was 965, about equally divided among "best," "average," and "poorest." After the officers' ratings had been made, the men were given the usual psychological test. Comparison of test results with officers' ratings showed:

- (a) That the average score of the "best" group was approximately twice as high as the average score of the "poorest" group.
- (b) That of men testing below C-, 70 per cent were classed as "poorest" and only 4.4 per cent as "best."
- (c) That of men testing above C+, 15 per cent were classed as "poorest" and 55.5 per cent as "best."
- (d) That the man who tests above C+ is about fourteen times as likely to be classed "best" as the man who tests below C-.

THE PRINCIPLES OF SCIENTIFIC TESTS

- (e) That the per cent classed as "best" in the various letter groups increased steadily from 0 per cent in D- to 57.7 per cent in A, while the per cent classed as "poorest" decreased steadily from 80 per cent in D- to 11.5 per cent in A. The following table shows the per cents for each letter group:

	D-	D	C-	C	C+	B	A
Total number	29	60	121	231	229	191	104
Classed with "best" . . .	0.0%	6.7%	19.0%	26.0%	39.3%	53.4%	57.7%
Classed with "poorest" .	79.3%	65.0%	57.9%	31.2%	24.9%	16.7%	11.5%

Considering that low military value may be caused by many things besides inferior intelligence, the above findings are very significant.

2. In an infantry regiment of another camp were 765 men (Regulars) who had been with their officers for several months. The company commanders were asked to rate these men as 1, 2, 3, 4, or 5 according to "practical soldier value," "1" being highest, and "5" lowest. The men were then tested, with the following results:

- (a) Of 76 men who earned the grade A or B, none was rated "5" and only 9 were rated "3" or "4."
- (b) Of 238 "D" and "D-" men, only one received the rating "1" and only 7 received a rating of "2."
- (c) Psychological ratings and ratings by company commanders were identical in 49.5 per cent of all cases. There was agreement within one step in 88.4 per cent of cases, and disagreement of more than two steps in only $\frac{1}{10}$ of 1 per cent of cases.

COMMERCIAL TESTS AND HOW TO USE THEM

3. In another camp the company officers of a regiment were asked to designate the ten "best" and ten "poorest" privates in each company. The officers had been with their men long enough to know them thoroughly. Comparison of the officers' estimates with the results of intelligence tests brought out the following facts:

- (a) Of 156 men classed with the ten "best" in their respective companies, only 9 tested below C-.
- (b) Of 133 men classed with the "poorest" ten in their respective companies, only 4 tested above C+.
- (c) Men above C+ are 7.3 times as likely as men below C- to be classed with the ten "best."
- (d) Men below C- are 10.8 times as likely as men above C+ to be classed with the ten "poorest."
- (e) An "A" man is 11.7 times as likely as a man below C- to be rated "best"; but a man below C- is 13.5 times as likely as an "A" to be rated "poorest."

4. The same experiment was made in still another camp. Officers of 36 different companies picked the ten "best" and the ten "poorest" men in each company. Of the "poorest," 62.22 per cent tested below C- and only 3.06 per cent above C+. Of the "best," 38 per cent tested above C+ and only 9.72 per cent below C-. According to this investigation, a man below C- is 6.4 times as likely to be "poorest" as to be "best." A man above C+ is 12.5 times as likely to be "best" as to be "poorest." A man rating A is 62 times as likely to be "best" as to be "poorest." A man rating D- is 29.3 times as likely to be "poorest" as to be "best."

5. Where commissioned officers are selected on the basis of trying out and "survival of the fittest" it is ordinarily found that about 80 per cent are of the A or B grade, and only about 5 per cent below the C+ grade.

THE PRINCIPLES OF SCIENTIFIC TESTS

Of non-commissioned officers chosen by this method, about 75 per cent are found to grade A, B, or C+, and only 5 per cent below C. Moreover, there is a gradual rise in average score as we go from privates up through the ranks of privates first class, corporals, sergeants, sergeants first class, Officers' Training School candidates, and commissioned officers. This is seen in the following table:

Various Groups (Whites)	Per cent earning each letter rating							
	D—or E	D	C—	C	C+	B	A	A & B
8,819 Commissioned Officers	0.0	0.01	.25	2.92	13.8	34.6	48.4	83.
9,240 O. T. S. Candidates	0.0	0.14	.98	6.16	19.5	36.4	36.8	73.2
3,393 Sergeants	0.0	1.05	4.05	14.2	27.3	32.5	20.9	53.4
4,023 Corporals	0.0	1.33	7.33	20.33	31.3	26	13.7	39.7
81,114 Literate Privates	0.22	10.24	21.48	28.79	20.48	12.38	6.37	18.75
10,803 Illiterate Privates	7.8	41.16	29.11	14.67	4.43	1.95	.52	2.47

6. Experience shows that "D" candidates admitted to Officers' Training Schools almost never make good, and that the per cent of elimination among the "C—" and "C" students is several times as high as among "A" students. For example, in one of the Fourth Officers' Training Schools 100 per cent of the "D" men were eliminated as unsatisfactory, 55 per cent of the "C—" men, 14.8 per cent of the "B" men, but only 2.7 per cent of the "A" men. In another Fourth Officers' Training School 76.2 per cent of the men rating below C were eliminated in the first six weeks, 51.5 per cent of the "C" men, and none at all of the "A" or "B" men. These findings are typical.

COMMERCIAL TESTS AND HOW TO USE THEM

The psychological ratings are valuable not so much because they make a better classification than would come about in the course of time through natural selection, but chiefly because they greatly abbreviate this process by indicating *immediately* the groups in which suitable officer material will be found, and at the same time those men whose mental inferiority warrants their elimination from regular units in order to prevent the retardation of training. Speed counts in a war that costs fifty million dollars per day and requires the minimum period of training.

The mental tests are not intended to replace other methods of judging a man's value to the service. It would be a mistake to assume that they tell us infallibly what kind of soldier a man will make. They merely *help* to do this by measuring one important element in a soldier's equipment, namely, intelligence. They do not measure loyalty, bravery, power to command, or the emotional traits that make a man "carry on." However, in the long run these qualities are far more likely to be found in men of superior intelligence than in men who are intellectually inferior. Intelligence is perhaps the most important *single* factor in soldier efficiency, apart from physical fitness.

UNITED STATES ARMY TRADE TESTS

In addition to the intelligence tests, the army personnel department found it necessary to select individual soldiers for more than one hundred different trades required for military purposes. The quick way to select experts, journeymen, apprentices, and novices was to give standardized trade tests to the individuals selected from the personnel card index. These tests were of three kinds:

1. Oral, consisting of questions on typical technical

THE PRINCIPLES OF SCIENTIFIC TESTS

points; 2. Picture, in which the parts of a machine, for example, might be pointed out and named; and 3. Performance, in which objects were actually made in a machine shop, or an automobile was maneuvered between stakes.

STANDARDIZED EDUCATIONAL TESTS IN BUSINESS

THE MEASURE OF INTELLIGENCE UNDER THE INFLUENCE OF HABIT

It is of undoubted value to business to select employees of good natural intelligence, but business uses intelligence under the domination of habit. It is important for the employer to know a given person's existing habits, and also his power to acquire new habits, especially if that person is to be employed in the more mechanical orders of activity. In the higher orders of activity the native powers of intelligence are the more important. In the case of those who go through the usual years of promotion, the employer is given an opportunity to determine native ability by direct observation. The object of tests is to arrive in a few minutes at results which it would otherwise take years to work out satisfactorily.

In the hiring of office help, particularly, it is most desirable that the employer should be able to judge the applicant's power to develop habitual accuracy. To measure such accuracy, Marshall Field & Co. give to all prospective sales people a day's instruction and practice in the filling out of sales checks. Usually applicants learn to do the work in three to six hours during one day. Those who fail to learn in one day are given a second day, but very few who are incapable of learning the first day are able to learn the second day; and those who do not learn the second day never learn at all,—

COMMERCIAL TESTS AND HOW TO USE THEM

are mentally incapable of learning. A standardized test would within half an hour eliminate those incapable of learning and so save their time and the time of instructors.

SIGNIFICANCE OF ACCURACY AND SPEED

The attainment of a high degree of accuracy in figures (for example) is at once an evidence of mental capacity and a proof of mental training. The habit of 99 per cent accuracy is required in business regardless of speed, and it should be required in the classroom. Extreme accuracy in handling figures shows a certain mental capacity, and also a discipline in mental control which inevitably must carry over into all the activities of life. It is conveniently measured with figures, but it is significant of far more than the mere mechanical ability to use figures. I speak of extreme accuracy or approach to the 99 per cent standard of business.

After accuracy, the speed with which common operations are performed is important by way of showing how much each person is likely to be worth on the basis of accomplishment. But unless it is known how much practice there has been, a test of speed has little value, and so it is of minor importance in choosing beginners.

LIMITATIONS AND ADVANTAGES OF STANDARD EDUCATIONAL TESTS

A test on figures is an extremely narrow one, and it has great significance only when a very high degree of accuracy is attained. A test on figures is theoretically as nearly pure as any test can be. Absolutely parallel tests may be arranged, and an exact parallel is probably possible with no other kind of test. Other subjects have their similar advantages and disadvantages.

THE PRINCIPLES OF SCIENTIFIC TESTS

THE NATIONAL TESTS: SUBJECTS AND METHODS

REPRODUCING INSTRUCTIONS

The employer wants to know the young applicant's ability to carry an oral message and to write a message or business letter. It is difficult to test ability to carry an oral message, but it is quite possible to test ability to write a message.

Writing a message involves several elements. To measure ability in this direction, it is necessary to divide the message into its component parts or elements and measure each by itself. These elements are: the power to reproduce instructions or to follow directions; spelling; grammatical correctness; punctuation; and command of vocabulary.

In the National Ability Tests two methods of measuring power to follow instructions are indicated. One is to require the memorizing, during five minutes, of instructions containing a certain number of facts, and then to allow ten minutes for reproducing those instructions in writing. Each significant fact being identified, the number of facts reproduced is the measure of efficiency. In the other method eight points are mentioned in an advertisement for a position. A letter of application in response to the advertisement is checked for the number of points on which some comment is made. The points overlooked are recorded as so many omissions. This latter method is the less satisfactory, but as it is combined with a general composition test, it requires little time to apply.

SPELLING

The spelling tests are based on a selection of words frequently used in business and likely to be misspelled.

COMMERCIAL TESTS AND HOW TO USE THEM

The elementary test is keyed to the 50 hardest words in Ayres' list of 542. An advanced test is made up from about 1000 words selected from the Jones, Eldredge, and other lists.¹

The first result of these tests would be concentration on the list of words most commonly used and most likely to be misspelled. The second result would be a serious effort to break up habits of inaccuracy in spelling. The third result would be the elimination of those mentally incapable of learning to spell.

PUNCTUATION

Tests in punctuation and grammar go a step farther than those in spelling, in requiring the application of intelligence of a higher order. For punctuation tests, the first essential is to find out the frequency with which different principles of punctuation are applied in actual practice. Unfortunately no wide investigation of this matter has ever been made, and there are very grave difficulties in the way of making such an investigation. The author in his *Minimum Essentials of Punctuation* has gathered in order of frequency of use the elements he has found employed in business letter writing. These are: first, the grouping of words into sentences by means of capital letters and periods; second, the grouping of clauses within sentences by commas; and third, the grouping of phrases within clauses by commas. A very few uses of semicolons and colons, dashes, parentheses, and quotation marks are of importance. The use of capital letters to distinguish individual from class words, and the use of hyphens to indicate divisions of compound words and of words at ends of lines, are also important.

Each of the principles involved can be covered several

¹ The author has used this selection in his *100% Speller*.

THE PRINCIPLES OF SCIENTIFIC TESTS

times in every test. A paragraph is given to sentences in the elementary grammar test; and in the punctuation test a paragraph to capital letters; a paragraph to the comma; and in an "advanced test" a paragraph is given to use of the other marks in combination with the comma. In each parallel test the same number of points of each sort should be allotted to word groups of equal difficulty. Where usage differs, correctness according to any acceptable authority should be recognized. Very close expert judgment is required in the preparation of a parallel test if equal difficulty is to be secured and if a subtle easing or strengthening of the test is to be avoided.

In this test we measure intelligence in bringing meaning out of unpunctuated words by means of punctuation marks. Though no rules are asked for, only persons who have the habit of applying the right principles correctly will be able to make high records. The test gives a measure of practical knowledge of punctuation modified by intelligence in applying that knowledge in just the way that business requires.

GRAMMAR

The test in grammar requires much the same choice between right and wrong forms that business conversation or writing requires. Again, in the preparation of this test, a compilation must be made of all common points of correctness that are likely to be violated. Careful investigation shows that there are fewer than fifty of these points; and every test can epitomize the more important of them. In his *Minimum Essentials of Correct Grammatical Usage*, the author has arranged possible points in order of frequency of use. The elementary test in grammar differs from the advanced test only in this respect — that the points involved are the

COMMERCIAL TESTS AND HOW TO USE THEM

more frequently violated and should be the first attacked by a teacher. Each numbered paragraph gives several applications of the same principle. If some of these applications are incorrectly marked, it shows more surely that the principle is not understood than if an explanation of the principle had been called for.

This, then, is a test of knowledge of grammatical usage combined with a test of mental ability to apply a simple principle in practice. Such simple tests would first develop the habit of maximum attention to the facts and principles most commonly required in practical life; and, secondarily, they would come to be a measure of intelligence under the fully developed habit.

BUSINESS PRACTICE TESTS

WRITING ADDRESSES

A ten-minute test on envelope-addressing with a pen is useful in many ways: (1) It gives material for grading penmanship by such a scale as Ayres' (his Gettysburg scale is recommended); (2) it is probably the best indication of natural speed, since all school work nowadays demands more or less writing and all persons in school may be supposed to have developed their maximum natural speed in writing; (3) it gives a fair indication of natural accuracy.

FILING OR ALPHABETIZING

When the envelope-addressing is completed, the same 20 slips of paper may in 2 minutes be arranged in alphabetical order according to state, town, and individual, and the numbers of the successive slips written down for easy checking. Here is a quick and convenient test on filing.

THE PRINCIPLES OF SCIENTIFIC TESTS

TABULATION (MENTAL ALERTNESS)

This test consists of picking out of a list of 15 a certain number of individuals who conform to set requirements under four different heads. It requires but 2 minutes, but needs a nimble and accurate mind. As a very brief test of intelligence in office work it is exceedingly valuable. It was adapted from a much longer test used by the Metropolitan Life Insurance Company and is said to have been originated by Professor E. L. Thorndike.

TYPEWRITING

Till now there seems to have been but one recognized and standardized business practice test of any kind, and that has been the International Typewriting Contest, originated and prepared by J. N. Kimball, 1358 Broadway, New York, who is the veteran contest manager for the entire United States. Mr. Kimball has developed typewriting speed with accuracy to a point that once would have seemed impossible. In 1907, when Miss Rose Fritz wrote 87 words a minute, the achievement was considered marvelous; but now Miss Owen writes 143 words net a minute, that being the average for an hour.

The basis of the contests has been standardized matter prepared by Mr. Kimball. Penalizing for every error by the deduction of five points from the speed record has operated to give practically every contest to the accurate rather than to the merely speedy competitor. This tendency has been still further emphasized by increasing the penalty to 10 words for each error, yet the net speed has increased.

For these contests it has been necessary to provide uniform material, which should average a certain number

COMMERCIAL TESTS AND HOW TO USE THEM

of strokes to each word. The need for uniformity of matter in tests for school and commercial purposes has not been generally recognized. While the test material sent out by the typewriter companies for their monthly awards has been extensively used by schools, employers have taken any convenient material, not fully realizing that a comparison of words per minute was not fair unless the character of the material was indicated.

For commercial purposes, actual letter matter should be used; and the artificial use of short words easily reproduced on the typewriter should give way to random average business practice. While covering a considerable range of subjects, the matter ought to be uniform in general difficulty. A word basis should give way to a stroke basis; or results might be expressed on an arbitrary word basis by dividing the total number of strokes by five or six. A distinction should be made between errors that a business man might pass in a letter and those that would make a letter useless; and the two classes of errors ought to be recorded separately.

In international contests it has been found necessary to use hour tests to decide the merits of close competitors. The business man, however, gains no additional advantage from tests that include more than a single letter of 300 words. Such a letter will go on one sheet (single-spaced), and few operators in business offices will finish such a letter in less than five minutes. To get it out in five minutes would require the writing of 60 words a minute, and that is about the maximum speed in offices. If there is greater speed, the same letter can in part be reproduced again. In any case, the body of the letter must be completed in five minutes.

This test may also be used for a straight typewriter copying test.

THE PRINCIPLES OF SCIENTIFIC TESTS

In addition to this a blank form is provided to be copied line for line, space for space, to test the power of absolute reproduction as required for mimeograph work. It is extremely important for a business man to know with what degree of exactness a page blank can be reproduced, and it is very useful for the teacher to know just how highly he values exactness in this kind of work.

BOOKKEEPING

The requirements of bookkeeping are divided into three elements. The first of these is accuracy and speed in handling figures. The most important operations with figures are adding, subtracting, multiplying, and dividing whole numbers; multiplying certain common fractions by short-cut methods and otherwise; and using decimals in percentage.

The second element required in the practice of bookkeeping is ability to make records on business blanks, such as invoice forms of some complication.

The third element required is the analysis and classification of accounts, as in journalizing or ledger-posting.

S. A. Courtis of Detroit has shown how tests on arithmetical operations may be prepared and conducted. His tests in adding, subtracting, and multiplying have been taken as a basis for the National Tests, but they have been shortened. As all figures have to be copied before they are added in actual business practice, it has seemed best to extend the test on adding by requiring the copying of each column before it is added. The copying requires a trifle less time than the adding, and the time for the combined test in copying and adding has been fixed at four minutes. Courtis's tests on subtraction and multiplication have simply been cut in half. But to make a closer comparison possible, all

COMMERCIAL TESTS AND HOW TO USE THEM

figures in the answers are to be counted, and figures wrong are to be considered instead of problems wrong. The same principles have been carried into the national tests on fractions and on percentage.

For a test on accuracy in filling out business blanks, the ordinary invoice form gives a very convenient basis. The advantages its use affords are as follows: (1) The invoice is universally understood. (2) In three sales transactions fifty blank spaces may be correctly filled or left blank, and the test can be readily graded in a purely mechanical manner by counting the errors in these spaces. (3) Instructions for filling the spaces can be used as a reproduction test which may precede the Invoicing test, and so time and space may be economized.

A higher test on judgment in classification of items in journalizing or posting is certainly needed, but has not yet been worked out.

OBJECTIONS TO SCHOOL PROBLEMS IN ARITHMETIC

School examinations in arithmetic often consist largely of problems, such as those asking how many rolls of paper are required for a room of given size. These problems require reasoning, and so are regarded by educators as of a higher character than those involving merely the mechanical handling of figures. Why have not problems of this sort been introduced into generally used, standardized tests?

The first reason is that no single class of problem is universal in business. The second reason is that satisfactory standard tests on higher mental activity are very difficult to construct, and are uncertain in results. Most higher mental operations unite several mental processes which interfere with each other, and cannot readily be separated in grading. It is therefore safer to stick to the simpler elements.

THE PRINCIPLES OF SCIENTIFIC TESTS

ANSWERING LETTERS

The best simple test on composition is the answer to an advertisement offering a position, since every one knows what applying for a position means. This is the National Elementary Test. All kinds of errors are counted up, with a list of about 50 questions as a guide for checking. Only with such a list of questions to check by is it at all possible to have a scientific or uniform checking of any form of composition by different teachers or pupils (or even by the same teachers at different times). Tests have shown the same composition to be marked 40 per cent by one teacher and 90 per cent by another. What possible *real* value can such marking have?

Of tests on higher mental activity, that on answering letters has proved markedly successful.

Three letters involving nine points are given to be answered, and the facts required to answer them are to be found in catalogue pages supplied a day in advance so that the person tested may become familiar with their contents. Or some of the facts may be answered by the exercise of common sense.

In grading, such a test as this must be divided into its elements, — how many of the nine facts have been properly covered? have the explanations been made in clear and sympathetic language? is the conventional form of the letter correct? how many errors of all kinds are to be found, checked up on the principles used in grading the letter applying for a position?

Trained correspondents of the National Cash Register Company and the Burroughs Adding Machine Company handled the National Test in letter-writing with ease, though few were able to make perfect records on it. Order clerks of the National Cloak & Suit Company

COMMERCIAL TESTS AND HOW TO USE THEM

who had no familiarity with the forms of letter writing were able to find the facts and state them because of their general business training. They made a record of $3\frac{1}{2}$ (fair) on facts and statement, as compared to $4\frac{1}{2}$ (good) on a scale of 5 made by the trained correspondents. High-school graduates untrained in business could not handle the test. Yet an eighth-grade class in Gary and another in Racine, after five weeks of training in such work, were able to make passable records on this test.

IV

THE NATIONAL TESTS IN THE CLASSROOM

PRACTICAL ADVANTAGES OF STANDARD TESTS

FAIRNESS OF THE NATIONAL TESTS

STANDARD tests have hitherto been used largely by superintendents to determine the shortcomings of pupils and teachers.

Pupils and teachers are far more likely to overcome their difficulties if they first find out their own errors by testing themselves. They fear the unreasonable character of an unfamiliar examination. They dread the unfairness of the element of personal judgment that runs like a rusty thread through the fabric of nearly all ordinary examinations. If it is good for teachers to discover their errors so that they can correct them voluntarily, it is still better to let pupils discover their own errors. It is far more likely to put them in a mood to do the hard work necessary to overcome their difficulties.

The National Tests have been worked over by so many persons that all suspicion of unfairness has been rubbed out of them. Every pupil and every teacher will admit that they are fair. This can never be said of a test devised by one person alone, however fair-minded he may think he is.

FEASIBILITY OF GRADING BY PUPILS

Many will admit the desirability of having pupils correct and grade test papers, but will doubt that it can be done. The author did it successfully on the second attempt at Gary, with 750 pupils in the seventh, eighth, and ninth grades. The first attempt was a failure because pupils overlooked 2 per cent or more of errors on a single checking. It was found that a second checking was necessary.

COMMERCIAL TESTS AND HOW TO USE THEM

In reality a third review, made by the owner of the paper, is desirable. He should be allowed merely to call attention to possible discrepancies.

In Racine the system was carried through with 1500 pupils, handled by 40 teachers who were called together and given special training in the conduct of the tests. A series of ten different tests was carried through and the entire work was completed between Monday morning and Friday night, two of the days having been required by the author to inspect the tests, figure medians, and make out the report to the superintendent. This report is shown in the Appendix.

In New York, at the end of 1917, the tests were given to 6000 eighth-grade pupils, three tests to each, with nothing more than general directions to those who supervised the tests. Results depended on reading the instructions step by step as they are given in this book. The margin of points overlooked or wrongly marked was not sufficient to change the median for any class as much as 1 per cent.

REQUISITES TO SUCCESS IN GRADING BY PUPILS

Successful grading by pupils depends on :

1. Asking pupils to do only one thing at a time. When they are asked to do two things at a time, errors result from confusion. For example, pupils were asked to count up the errors, and then to deduct 2 from 100 per cent for each error. Here were three steps to be taken at the same time, — counting up, multiplying, and subtracting, not to mention writing down. Many errors were made, and so the pupils were asked only to count up the errors and write down the number. It was easier to deal with these small counts, and the percentage was readily figured by the inspector.

THE NATIONAL TESTS IN THE CLASSROOM

2. Arranging the paper so that everything is perfectly clear. Poorly printed mimeograph sheets will not work well. Spaces should be assigned for each entry to be written on the paper. The check marks should be kept within a blank space at the right side so that they can easily be counted up.

3. Having every paper checked twice, and taking pains to see that poor papers are marked by bright pupils, and that if a paper is marked once by an especially dull pupil, it is marked the second time by an especially bright pupil. A little attention to this matter of exchanging papers will go a long way toward eliminating defects due to the work of the 2 per cent of subnormal pupils. When a class is divided into two groups, the upper consisting of those who have been promoted and the lower of those who have lagged behind, test papers from the upper group will be likely to come through clean, while test papers from the lower group will probably be in poor condition in spite of every precaution. In such cases, the brighter division should be asked to make the second checking for the poorer division. The first checking is best made by the original class, since this is part of the educational work; but the second checking may be passed on to some other class.

4. Giving pupils plenty of time for the checking of papers. Opportunity should always be given for the asking of questions, and directions or answers should be repeated as many times as necessary. Indeed, the teacher should pause to invite questions, but without allowing waste of time.

5. Making the class feel that it is doing a very important piece of work for the superintendent or principal, and that for this hour every pupil is in duty bound to use his wits and concentrate his attention. Here is a real scientific

COMMERCIAL TESTS AND HOW TO USE THEM

job that young children can perform as well as experts, if they will only give their minds to it. This atmosphere of importance must be encouraged by the teacher and maintained throughout the work.

TIME REQUIRED

The time for handling tests is in part adapted to the usual class period of forty minutes. A test given in fifteen minutes can usually be checked twice in the remainder of the period; the results could be tabulated in twenty minutes additional. Or a grammar and punctuation test, elementary and advanced, could be taken in one forty-minute period, checked twice in another such period, and then tabulated and discussed with the class during a third period.

TESTS AS A MEASUREMENT OF PROGRESS

Teachers are accustomed to cover a number of pages in a textbook, and then give an examination on those pages. They do not quite understand the philosophy of beginning a term or a month's work with a test.

Of course, when a subject is taken up for the first time, no test can be given. A test on typewriting before the pupil mastered the typewriter would be folly. A test before instruction on letter-writing would also be useless. But at the end of the sixth grade the fundamentals of English and arithmetic have been taught, and it is well enough to end the work of the sixth grade or to begin the work of the seventh grade with the same test. In typewriting, the first test should be given as soon as the keyboard exercises have been completed and the whole machine has been covered so that a business letter may be copied. The test may show a net speed of only seven

THE NATIONAL TESTS IN THE CLASSROOM

or eight words a minute, but it offers a point from which to measure progress.

As soon as the operations of typewriting or arithmetic are understood, and the development of speed and accuracy must begin, a test is given. At the end of a period of weeks another parallel test is given and a comparison of results furnishes a measure of progress in habits of speed and accuracy. The development of habit can be measured only by standard tests. Ordinary examinations furnish but rough aids to the judgment of the teacher, and the result is usually very imperfect.

A test starts the work of a class smoothly. At once and in concrete form it gives pupils an idea of the ground they have to cover.

Some pupils will be found already to have acquired the habits of accuracy and speed which the teacher expects the class to attain. Such pupils should be given supplementary work from the very beginning of the term. No teacher can intelligently assign supplementary work to very bright or very poor pupils without a test to base the assignment upon. Bright pupils and poor pupils are ordinarily sacrificed to the middle portion of the class, the average. The tests give a scientific individual basis for work.

Pupils who are below the average need special help. Usually no such help is given them and they are retarded. When the work starts with a test, teachers can at once find out who are the more backward pupils and provide help for them from the first. This can be done in any one of several ways. Parents can be informed and asked to give an hour each evening to work with their children. Or an extra hour each day under a study-help teacher can be provided in the school, the time being taken from a period assigned to music or some extra subject which may

COMMERCIAL TESTS AND HOW TO USE THEM

not be so necessary to the particular pupil. This extra help from the very beginning of the term is almost certain to bring the pupil through the work with his class.

Since a test must be carried out as nearly as possible on a 100 per cent basis, pupils have at the outset a very good illustration of what the 100 per cent standard in business really means. You can talk to them about it and they will not understand. Give a test that must be handled at the 100 per cent point, and they understand very well.

SECOND TEST AT END OF SIX WEEKS

In our school system, monthly examinations are gradually giving way to six-weeks examinations and reports. It requires about one week to give opening tests and final tests, and to make up reports. This leaves five clear weeks for straight class effort. In practice that has proved to be an excellent interval. Six weeks might be called the *term unit*, the nine months of the school year being made up of two semesters, each consisting of three six-weeks periods.

It is widely admitted that concentration on one subject at a time, in English especially, produces as high as 25 per cent better results than does the method of mixing different subjects together. Six weeks is a good period for concentration on one subject, such as punctuation or grammar. After that the pupils want a change. The standard test record shows them just where they start, and just where they end; and after a time, when another period on the same subject is about to begin, a new test shows just how much has been forgotten during the interval.

English is a subject of many phases. Spelling, grammar, punctuation, and composition are all different subjects of study, and a right balance in the course is impos-

THE NATIONAL TESTS IN THE CLASSROOM

sible unless each of these is measured by itself. One teacher likes composition, one likes spelling; one is good on grammar, another prefers reading and literature; but nearly every teacher slights one or another of these subjects. In one school it is punctuation that is below standard, in another it is grammar, and in another it is spelling. Such weaknesses would be instantly detected if the superintendent had these standard test records before him.

ABUSE OF STANDARD TESTS

Teachers will always try to make good records on public tests, and there is a natural tendency to neglect subjects that are not tested. High records are made by an excessive sacrifice of time.

For example, when high schools compete with each other on typewriting, each school selects its competition squad of 10 or 15 and makes that squad work out of hours for weeks. The trophies go to the school whose students have put in the most hours of practice, and the extra hours are usually taken from some other subject. This is a vicious condition.

AVOIDING ABUSE OF TESTS

There is, however, an easy way to avoid such a difficulty. If at the end of the year there is a public test on grammar and punctuation and none on reading, teachers are pretty sure to put in most of their time on grammar and punctuation. But if one six-weeks period is given to punctuation alone, another to reading, another to grammar and nothing else, and still another to letter-writing, the teacher and the pupils are judged by what they accomplish in a given length of time, not on how much they sacrifice everything else in order to make a special showing in one

COMMERCIAL TESTS AND HOW TO USE THEM

subject. The neglect of the time element is the whole cause of the vicious character in former tests.

CERTIFICATES TO SHOW TIME SPENT IN PRACTICE

Teachers should be given certificates which would show a record of work in this form :

SUBJECT	OPENING TEST	FINAL TEST	IMPROVEMENT	TIME IN CLASS	TIME IN HOME STUDY
—	00	00	00	— hrs	— hrs

Under this system teachers with poor classes can make better records than teachers with good classes, since the poor pupils have a bigger chance for improvement, and it is harder to improve high records than it is to improve low ones. The tests will stimulate work with classes that need it most; and they will tend to put courage into poor classes, since these can make just as good showing in improvement as good classes can. The tests will also help to correct the evil of laziness on the part of bright pupils, who, because they are already well up with the average, only waste their time. If they make no improvement during a period, this fact will show that they have been idling.

A SCIENTIFIC BASIS FOR SCHOOL MARKS

Business men have had very little confidence in school marks, largely because they know that the marks represent a mixture of considerations and it is impossible to tell which consideration was dominant.

Some teachers say that marks should be given on absolute attainments, that those who cannot come up to the standard should be marked in such a way as to emphasize their failure. They think it is sentimental to mark on any other basis. Other teachers argue that the

THE NATIONAL TESTS IN THE CLASSROOM

only fair basis for marking is furnished by improvement and effort. If a pupil works hard and shows fair improvement, such a teacher will give a high mark as a reward for effort even if the absolute attainment is still low.

Much may be said for both these views. It is unreasonable to penalize a pupil because he started with a handicap, if he makes a fair effort and secures a reasonable improvement. At the same time it is a gross injustice to the community to send out graduates with high marks when they have not attained the degree of mastery that entitles them to such marks. We need both an absolute and a relative standard, and the wrong lies in mixing the two indiscriminately.

The only scientific basis for school marks is a double record of absolute attainment and relative improvement, separately stated.

These standardized tests, used at the beginning and at the end of short periods of intensive work, afford first of all an absolute measurement of attainments; and it is pure sentimentality to hide weakness. But during the period of study, the improvement that is made is the important thing, and the poorest and the best have equal credit for what they accomplish. In Gary there was a very poor class, made up of those who were left after a good class had been selected from the original number. That class was so much below grade that the teacher was exceedingly discouraged. But during a drill period of five weeks it showed an improvement of 35 per cent in spelling, whereas the brightest class showed an improvement of 25 per cent. It was a triumph which changed that backward class with a discouraged teacher into a courageous group of boys and girls who were determined to go forward even if they were behind at the start. In another case one class was so much in advance of the

COMMERCIAL TESTS AND HOW TO USE THEM

others that warnings were given to the effect that improvement could hardly be shown on the second test. But on the second test it showed greater improvement than any other class, and the real efficiency of the teacher was demonstrated.

HOW IMPROVEMENT SHOULD BE MEASURED

Statisticians have held various views as to how improvement on these standard tests ought to be figured. Some have said that if 10 errors were shown on one test, and 5 on the next, the errors were reduced by 50 per cent, which was the measure of improvement; and that if only 4 errors were made on the first test and 2 on the second, the measure of improvement was likewise 50 per cent.

The fallacy in such figuring is shown by comparing the case of the boy or girl who misspells 25 out of 50 words on the first test, with the one of the boy or girl who misspells only 5 words. As this test is selected from 700 words, missing 50 per cent indicates that 350 of the entire list need to be learned, and missing 10 per cent indicates that only 70 need to be learned. Shall the person who learns only 35 words after the first test have equal credit for improvement with the person who learns 175? That is obviously absurd.

Also, we can readily see that the person who has 70 words to learn and gets 35 of them has done nearly the same amount of work as the person who has 350 to learn and gets 35 of them. In the first case the improvement is from 90 per cent to 95, and in the second case it is from 50 per cent to 55, — or 5 points in each case.

It is no doubt easier to learn 35 words out of 350 than it is to learn 35 out of 70, since the last 70 are probably more difficult than the middle 70. But the person who has learned all of 700 words but the last 70 has put a

THE NATIONAL TESTS IN THE CLASSROOM

large amount of work on the 70 also (through having gone over them along with the rest of the 700), and needs less additional work to complete the mastery of them.

The author's conclusion is that there can be no fairer basis for figuring improvement as shown on these tests than by measuring points of advance, — from 50 per cent to 55, improvement 5 points (not per cent), and from 90 per cent to 95, improvement 5 points also. But elementary and advanced tests need to be given together to furnish a fair measure of all improvement; for if a class has a median of 90 per cent and improves to a median of 95 per cent, it is certain that many members made 100 per cent, and there is no record of how much they might have improved. To the extent that 100 per cent is reached there is no measurement. To meet this difficulty, elementary and advanced tests are given at the same time, and improvement on both is added together. If a class starts at 90 per cent on elementary spelling and at 65 per cent on advanced spelling, and if it advances to 95 per cent on elementary and 75 per cent on advanced spelling, the total advance has been 5 points on elementary and 10 points on advanced spelling, or 15 points in all. This record is to be compared with that of another class which began with an average of 75 per cent on elementary spelling and 50 per cent on advanced, and which on the final test averaged 90 per cent on elementary spelling, showing an improvement of 15 points, and averaged 50 per cent on advanced spelling, showing no improvement. Each class made an improvement of 15 points, and the advanced class had as good a chance as the poor class to make a showing.

Improvement is best measured by the simple difference between the second record and the first record. But as a class approaches 100 per cent, the tests fail fully to

COMMERCIAL TESTS AND HOW TO USE THEM

measure all who reach 100 per cent, and full measurement requires that an advanced test on which 100 per cent cannot be made by any pupil be given at the same time.

VALUE OF THE TESTS TO PUPILS

When the tests are carried through and the pupils correct the errors and grade the papers, they are brought face to face with their own weaknesses. They realize that every shade of unfairness, partiality, and favoritism has been removed, and they see a cold, scientific record of their own work, produced by an impersonal test machine. The effect on their minds is very marked. They are shocked out of their self-complacency, and if anything will make them go to work, this experience will.

The very exact and fixed conditions of each test are a powerful stimulus in themselves. Conditions in the classroom have always been loose and changeable; but these tests are carried out according to the standard principles of sports. Every one knows the rules exactly. They are applied impartially. And the pupils know all that is done. The work is done rapidly. The dragging pace of the classroom makes some pupils nervous, and no wonder. It is refreshing for them to be put in a position to answer 50 questions in 15 minutes instead of 10 in an hour. All games are carried on at normal or competitive speed — 5 to 15 minutes in a unit such as a football quarter or a baseball inning — and these tests are in similar short units. The quick, hard rush always appeals to the American. The author has seen teachers enter strange classes, which were in great disorder, and in three minutes have the pupils quiet and hard at work on one of these tests. Nothing starts off a term and a new kind of work so well as a test on such prior work as must furnish a basis for what is to be done.

THE NATIONAL TESTS IN THE CLASSROOM

The tests are confessedly narrow and imperfect. Others need continually to be added that will measure other important powers of mind; and ways of escaping the limitations of the tests should constantly be sought. These tests are offered only as a good beginning, a blazing of the trail toward a new and more exact method of teaching certain definite things in such a way as to leave freedom for broad teaching of other matters that are still more important and which are entirely beyond the scope of such tests.

PART TWO—THE TESTS

V

TWO SERIES OF THE NATIONAL BUSINESS ABILITY TESTS

With Directions for Giving and Grading Scientifically

GENERAL DIRECTIONS FOR GIVING TESTS

FORMAL tests should be given by an "examiner" but corrected under direction of the teacher, two in the room all the time.

1. Read the directions word for word to the class, pausing after each step for them to be carried out. **DO NOT GIVE ANY EXPLANATIONS WHATEVER.** If questions are asked, read the directions again with any emphasis that will make the meaning clear, and then say, "I cannot answer questions. You will have to use your best judgment."

2. Do not waste any time; go ahead at a natural rate, but be careful not to be too quick or the minds of slow pupils will not follow you. Any single test should be given, checked, and rechecked in a 40-minute period, but tabulating will usually have to go over into another period. The entire section of grammar and punctuation tests together can most conveniently be marked in one period, checked up in a second, and tabulated in a third. Take up all papers (including any unused test papers) between periods, and lock them up without looking at them. Teachers should not recheck papers. The few errors overlooked by pupils will not affect the class average if directions have been followed faithfully.

3. The tests become an ideal lesson if you return the papers to the owners for review, and place on them the

TWO SERIES OF TESTS

responsibility of reporting their own grades. Answer questions freely at this point. Tell pupils they must be as careful not to get too high a mark as not to get too low a mark, for then on the next test they will not show the IMPROVEMENT which after all is equally important with a high grade to start with. If when you tabulate any pupil hesitates in giving his grades, insist on seeing the paper, or if you suspect the pupil might cheat, be sure to look at the paper. INSPECTION OF ALL SUSPICIOUS CIRCUMSTANCES WILL ELIMINATE ERRORS. Let it be clearly known that all papers will be taken up for inspection, even if no careful inspection is intended.

4. Make a point of seeing that papers marked the first time by dull pupils are marked the second time by bright pupils. Go arbitrarily and make these exchanges without remark.

5. It will save time to the teacher to have a pupil who writes a good hand copy the names of the class on the tabulating sheets before the test is made, and also copy on the board the standard averages of grammar-school graduates, high-school graduates, and experienced employees, so that each pupil can see on what level he stands as the checking goes on. On the next test he should have risen at least one level.

1. TEST ON TABULATION (MENTAL ALERTNESS)

A general intelligence test, requiring ability to carry four conditions in mind at one time in applying instructions.

Time allowed, 2 minutes. At the end of that time, turn over, cover, or erase the test.

Average experienced emps., 2 errors; beginners, 3.65 errors.¹

¹ The averages on these technical business tests have usually been derived from tests on 50 to 150 business employees in selected business houses, with results confirmed from various quarters. Usually em-

COMMERCIAL TESTS AND HOW TO USE THEM

*First Series*¹

From the following make two lists, one of boys and one of girls, who are 12 years old or over, who have passed the 7th grade, and have an average of 80 per cent or over.

	AGE	NOW IN GRADE	AVERAGE
Jones, Kitty	10	6	86%
Boswell, Joseph	14	7	60%
Harte, Flo.	12	8	90%
Cousins, John	16	7	50%
Ryan, Will M.	13	8	75%
Anderson, Jeanne	14	9	90%
Stearns, Harry	15	10	85%
Fogarty, May	16	11	92%
Foster, Joel	14	11	87%
Williams, Molly	13	7	85%
Jepson, Jack	12	8	82%
Johnson, Harry	14	7	76%
Baxter, Luella	12	8	85%
Robinson, Ed.	13	9	75%
Anderson, Martin	11	8	85%

ployees tested were grouped closely around the average, with little deviation in any one group; but the groups appeared to be on various levels according to salary paid, etc. In schools, on the other hand, the deviation was so wide that the numbers tested appeared entirely inadequate to furnish a basis for reliable averages, and little use has so far been made of the accumulated results. The distribution by levels has appeared to be more comprehensible and useful to business men and teachers than statistical calculation of "probable error" or "standard deviation," for which the material so far available has not really been adequate. Many observations have tended to confirm the general reliability of these tentative standards. The "levels" are: 1. Satisfactory business employees, such as stenographers and bookkeepers in high-grade houses; 2. Graduates of commercial departments of high schools; 3. Graduates of grammar schools who would be acceptable as beginners in first-class business houses; and in addition, 4. The level below No. 3; and 5, the maximum, or level above No. 1, which was actually attained by five or more persons tested.

¹ One of these tests may be given, and at a later date, if a fresh test is required, the second series may be used.

TWO SERIES OF TESTS

Second Series

From the following make two lists, one of men and one of women, who are over 40 years of age, who live in the 8th, 9th, 10th, or 11th wards, and who have insurance of \$1000 or over.

	AGE NEXT BIRTHDAY	WARD	INSURANCE
Ryan, Mrs. Kate	30	6	\$1,200
Jones, Joseph	55	7	700
Burton, Florence	41	8	1,100
Dabney, John	65	7	500
Ridgely, McDonnell	41	8	900
Weldon, Jennie	45	9	1,300
Stanley, Henry	50	10	1,100
Harcourt, Mrs. John	55	11	1,400
Girton, Joseph	45	11	2,000
Watson, Mrs. Mary D. . . .	41	7	1,100
Hazlitt, John M. . . .	44	8	1,050
Johnson, M. H. D. . . .	45	7	850
Kingsley, Mrs. James	42	8	1,100
Roberts, J. Edward	41	9	800
Burton, Martin H. . . .	40	8	1,000

DIRECTIONS FOR GIVING AND GRADING

(To be read word for word, without explanations. Repeat if necessary.

(Distribute test papers on the bottom of which answers can be written, or half sheets of paper, by preference $5\frac{1}{2}$ by $8\frac{1}{2}$.)

Step 1. Write your name at the top of the sheet in the center. In the second line at the left, write the name of your school, in the center of the same line your class, and at the right of the same line the date. At the left of the next line write "Checked by," and at the left of the line below write "Rechecked by" (unless these words are printed on the test).

COMMERCIAL TESTS AND HOW TO USE THEM

Step 2. Look at the test. Make two lists of names, one of boys and one of girls (or one of men and one of women). On the third line of your sheet, in the center, write the word "Boys" ("Men"). Skip six lines and in the center of the next line write "Girls" ("Women"). Consider each name carefully. (First Series.) When you find the name of a boy who is 12 years old or over, who has passed the seventh grade, and has an average of 80 per cent or over, write it in the first list. When you find the name of a girl who meets all these conditions, write it in the second list. (Second Series.) When you find the name of a man who is over 40 years of age, who lives in one of the wards mentioned — the 8th, 9th, 10th, or 11th — and who has insurance amounting to \$1000 or over, write it in the first list. When you find the name of a woman who meets all these conditions, write it in the second list.

You are allowed 2 minutes in which to complete the work. Start now.

Step 3. Exchange papers. Write your name in the line after "Checked by."

KEY TO FIRST SERIES

Step 4. As I slowly read the names that should be in the list, look for each name. The order in which you find it does not matter. Look the entire list through, and if you do not find the name make a small, heavy cross in a blank line below. If you do find it, make a small dash after it.

The names of the boys are —

Boys
Stearns, Harry
Foster, Joel
Jepson, Jack

TWO SERIES OF TESTS

The names of the girls are —

Girls

Anderson, Jeanne
Fogarty, May
Harte, Flo.
Baxter, Luella

Do you find any other names? If so, make a small, heavy cross after each.

Women

Florence Burton
Jennie Weldon
Mrs. Joseph H. Harcourt
Mrs. James Kingsley

Men

Henry Stanley
Joseph Girtton
John M. Hazlitt

Step 5. There are seven names in all. Count each of the names after which you have a small dash showing that it is correct, and then add the omitted names for which you have a cross in one of the blank lines below. If you count just seven with both of these, that will show you have the names correctly marked (omitting any name after which you have a cross because it was a name I did not read). This is simply a test to see if you have marked the papers correctly.

Step 6. Now count up the mistakes, the names that should not be in the list, which you have marked with a cross, and the omitted names for which you have a cross in the blank lines below. Count both lists together,

COMMERCIAL TESTS AND HOW TO USE THEM

girls and boys (men and women). Write the number of errors in upper right-hand corner opposite "No. of Errors."

Step 7. Exchange papers again. Write your name after "Rechecked by" at the head of the sheet.

Step 8. As I slowly read each name that should be in the list, if you find it see that there is a small dash after it, and if you do not find it see that there is a cross in a blank line below. Do not make a second dash if there is one already, nor a second cross; but if you find the name not marked or incorrectly marked, make the marking right. If it is omitted, and there is no cross in a blank line below, make a small, heavy cross. (Repeat the names from Step 4.)

Do you find any other names which do not already have a cross after them? If so, mark them with a cross.

Step 9. Now count up all the crosses, both those after names that are wrong (not in the list) and those in the blank lines below for names omitted, and see that the number of errors is written in the upper right-hand corner of the sheet. If the number already written there is correct, that is sufficient. Do not write it a second time. If it is incorrect, first cross it out, and then write beside it the correct number.

Step 10. Return papers to owners, — the original writers whose names are at the top of the sheet.

Step 11. Look over your paper and see if there are any crosses that should not be there. If you think you find a mistake, show it to me. Do not make any changes whatever on the paper yourself. I will make them. If you find two numbers written in the upper right-hand corner, show me the paper so that I can mark out the one that should have been crossed out. Notice that the

TWO SERIES OF TESTS

directions say "who have passed the 7th grade." If you have included Molly Williams, notice that she is now in the 7th grade: she has not passed it. (Second test: Notice that directions say "over 40 years of age." If you have included Martin H. Burton, notice that he is not *over* 40.)

Step 12. As I call the roll, give me the number of errors marked on your paper. Then we will collect the papers and I will look them over.

2. REPRODUCING INSTRUCTIONS

This is a test of memory and of willingness to work hard (natural industry).

Time allowed, 5 minutes to memorize the instructions, and 10 minutes to reproduce what can be remembered. The essential facts are more important than the wording.

Average for all classes, Fair — 3 (on a scale of 5).

First Series

INSTRUCTIONS

The following department store sales slips consist of three distinct portions intended to be torn apart; the upper portion is to be used as a shipping label when goods are to be delivered, the middle portion is to be handed to the customer and a duplicate sent to the accounting department, and the lower portion is to be filed by the inspector as a means of tracing errors.

The large figure "1" is the department number, and the sales person's number should be written after this in three different places on every check; but do not fill out the top portion if goods are taken.

The price of each article should be written in the

COMMERCIAL TESTS AND HOW TO USE THEM

column "Price," and the total amount under "Extension," but the same amount should not be repeated — write a single amount under "Extension."

For charge accounts and C. O. D., use only the slip on which the word "Charge" appears. When goods are taken on charge accounts, "F. M." should be written for signature of floorman; the same thing should be done when goods are charged to one address and sent to another, or when an exchange is made on a cash slip.

"Buyer" may be indicated as "Self," "Dau. Ella," or the like.

Second Series

INSTRUCTIONS ¹

The following wholesale sales slips consist of three distinct portions intended to be torn apart; the left-hand portion is to be used as a shipping label, the middle portion is to serve as an invoice to the customer, and the small coupon at the left is to be filed for reference by the shipping clerk. A carbon copy of the whole goes to the bookkeeper.

The printed figure "1" indicates the division in which the goods are sold, and the house number for the order (called "Our No.") should be written after this on each of the three portions. In addition the customer's order number should be written on each portion under "Your No."

¹ This second series would ordinarily not be given under four months after the first. If given within a week after the first it may serve to discover ability to avoid confusion of one series of instructions with another slightly different. Each point of confusion may be marked with a "C" and the number of points right penalized by deducting 1 for each instance of confusion. A third series will consist of entirely different instructions, for a quite different style of invoice.

TWO SERIES OF TESTS

The price of each article should be written in the column "Price," and the total amount under "Extension," but the same amount should not be repeated, — write a single amount under "Extension."

For charge accounts and C. O. D., use only the slip on which the word "charge" appears. When goods are shipped on charge accounts, the invoice must bear the O. K. of the credit manager, but this does not apply to C. O. D. or cash bills.

After "Ordered by" insert the name of the individual giving the order on C. O. D. and charge invoices, but not on cash bills.

On cash bills the shipping label should not be filled out.

DIRECTIONS FOR GIVING AND GRADING

(To be read word for word without explanations. Repeat if necessary.)

(Distribute letter-size sheets of paper, one sheet to each person tested. A sheet with a red margin line at the left is preferable.)

Step 1. Write your name at the top of the sheet in the middle, and in the next line at the left write the school, in the center of the same line write the class, and at the right of the same line write the date. On the next line write at the left "Checked by." On the fourth line write "Rechecked by" at the left. In the fifth line, at the center, write the word "Instructions."

Step 2. (The Instructions to be memorized should be covered until this point is reached. If they are handed out on slips of paper, they should be left on the desk turned face down until the test-giver says, "Turn over your test sheets.") I will allow you five minutes in which to memorize as much of these instructions as you can. If you get only one third of them you will do as

COMMERCIAL TESTS AND HOW TO USE THEM

well as the average. As the facts are more important than the wording, I suggest that you take the facts in order and try to fix them in mind. Now begin.

Step 3. Time is up. (Instructions should be covered. If slips have been given out, say, "Turn over your printed papers.") You now have ten minutes in which to write out as much as you can remember. Leave a margin of about one inch on each side of your paper, in which we can check up mistakes. Begin with a paragraph indentation under the word "Instructions" which you have already written.

Step 4. Time is up. All stop short. Exchange papers. Write your name on the blank line after "Checked by."

Step 5. There are twenty distinct facts stated in these instructions, and I will indicate them briefly, writing them on the board. Where you find fact No. 1 stated, make a figure "1" in the margin; where you find fact No. 2 stated, make a figure "2" in the margin. It does not matter whether they are in exactly the same order as I give them, though they will naturally come in that order. In case you are in doubt whether a given fact is properly stated or not, or you do not quite understand what I write on the board, always raise your hand and ask me. In marking these papers you must absolutely **KNOW** whether you are right or not. If you do not know, or are not sure that you know, you must find out. Raise your hand and ask me.

FACTS IN THE INSTRUCTIONS

First Series

1. "Department store sales slips" must be distinctly mentioned,
2. "Three distinct portions,"

TWO SERIES OF TESTS

3. "to be torn apart,"
4. "upper portion used as shipping label when goods are to be delivered,"
5. "middle portion to be handed to the customer,"
6. "duplicate to be sent to accounting department,"
7. "small lower portion to be filed by the inspector,"
8. "as a means of tracing errors."
9. "Large figure '1' is department number."
10. "Sales person's number written after this,"
11. "in three different places on every check";
12. "but do not fill out top portion if goods are taken."
13. "Price of each article to be written in column 'Price,'"
14. "total amount under 'Extension,'"
15. "but same amount not repeated, — single amount under 'Extension.'"
16. "For charge accounts and C. O. D. use only slip on which word 'Charge' appears."
17. "When goods are taken on charge accounts, 'F. M.' should be written for signature of floorman,"
18. "likewise when goods are charged to one address and sent to another,"
19. "or when an exchange is made on a cash slip."
20. "'Buyer' may be indicated as 'Self,' 'Dau. Ella,' or the like."

Second Series

1. "Wholesale sales slips" must be distinctly mentioned.
2. "Three distinct portions,"
3. "to be torn apart,"
4. "left-hand portion used as shipping label,"
5. "middle portion to serve as invoice to customer,"
6. "small coupon at left filed for reference."

COMMERCIAL TESTS AND HOW TO USE THEM

7. "Carbon copy of whole goes to bookkeeper."
8. "Printed figure '1' indicates division in which goods are sold,"
9. "and house number ('Our No.') should be written after this,"
10. "on each of three portions."
11. "Also customer's number written on each portion under 'Your No.'"
12. "Price each written in column 'Price,'"
13. "and total amount under 'Extension,'"
14. "but same amount not repeated, — single amount under 'Extension.'"
15. "For charge accounts and C. O. D. use only slip on which word 'Charge' appears."
16. "When goods are shipped on charge accounts, invoice must bear O. K. of credit manager,"
17. "but this does not apply to C. O. D. or cash bills."
18. "After 'Ordered by' insert name of individual, giving order on C. O. D. and charge invoices,"
19. "but not on cash bills."
20. "On cash bills the shipping label should not be filled out."

Step 6. Now look over the paper to see that every statement made is actually correct. If the statement is contrary to facts, erase or scratch out the figure indicating that point as covered; but change of wording does not matter. If you are in doubt as to whether the fact is fairly stated, ask me. (Allow as much time as necessary for this rechecking.)

Step 7. Count up the number of facts correctly stated in the paper. If 8 is the last number, do not stop with 8, but count them all over to see whether one or two have not been omitted. Write the number of facts correctly reproduced in the upper right-hand corner of the paper.

TWO SERIES OF TESTS

Step 8. Exchange papers again. Write your name on the blank line after "Rechecked by."

Step 9. Silently verify the statements of facts as I have them written on the board, taking one at a time as I point to each. If you are in doubt as to whether the fact is correctly stated, ask me as we go along. Start now with No. 1. (Slowly point to each of the others, warning the quick ones not to go faster than you point, so that the entire class can together give attention to each point as you come to it.)

Step 10. Once more count up the number of facts correctly reproduced. If your count does not agree with the first count, cross out the figure first made and write the correct count beside it. But to be sure you are right, count the facts over again. Do not leave two figures there so that I shall not know which is right.

Step 11. Return papers to owners, who will be given a few minutes to look them over and see if they have been fairly marked. Do not make any changes in the marking yourself. If you think you find an error, show it to me and I will make the change.

Step 12. As I call the roll, give me the number of facts you had right. If you have as many as 8 facts right, I shall call that "Fair — 3" (on a scale of 5), 11 facts "Good — $3\frac{1}{2}$," 14 facts "Good — 4," 16 facts "Excellent — $4\frac{1}{2}$," 18 facts "Excellent — 5." If you have only 7 facts right I will still call it "Fair — 3," but if you have but 6 facts I will call it "Poor — $2\frac{1}{2}$," 5 facts "Poor — 2," 4 facts "Poor — $1\frac{1}{2}$," 2 or 3 facts "Failure — 1." But I will make these ratings myself. You give me just the number of facts you find right.

(Collect papers.)

COMMERCIAL TESTS AND HOW TO USE THEM

3. TEST ON INVOICING

Printed blanks to be filled in are furnished with this test.

Follow the "Instructions" in the test on Reproducing Instructions. This is an intelligence test on applying the instructions.

This will always consist of entering sales transactions on invoice forms with 50 blank spaces to be filled or not filled. It is a test of ability to fill out any business blank according to instructions.

First, the test on memorizing instructions should be given (occupying 15 minutes), and then 15 minutes may be devoted to this test (always with the instructions at hand for reference).

Average for bookkeeping clerks familiar with invoices is $12\frac{1}{2}$ errors or 75 per cent (2 per cent deducted for each error), average of five highest, one error or 98 per cent (to indicate a conservative maximum possibility).

MATERIAL FOR THE TEST

First Series

1. Mr. E. H. Crain, 213 Warner Avenue, near Oakley Avenue, buys a \$35 overcoat, pays \$25 on it, and asks that you send it C. O. D. for the balance.

2. A customer approaches the counter with a pair of gloves which do not fit; the check would indicate that she paid \$2.50 for them. You finally fit her with a pair costing \$3.50. She pays you the \$1 difference and takes the gloves with her.

3. Mrs. D. M. Ferry, 711 Central Park Avenue, wishes to charge ten yards of dress goods at \$2.75 per yard to her account, and have goods sent to Mrs. Ivy Marshall, 318 Rush Street, near Superior Street, Apartment 6.

TWO SERIES OF TESTS

Second Series

1. Customer's Order No. 1620, Our Order No. 8765. Sold to Henry J. Sigel & Co. 10 bolts of #11a Sheeting, bleached, @ \$5. American Express, rush. Cash \$10, balance C. O. D. Address Ilion, Ill. Order given by Mr. Sigel.

2. Customer's Order No. 67, Our Order No. 8766. Sold to Martha J. Warren for cash, Milliner's Display Form #8, \$5. Taken.

3. Customer's Order No. 376, Our No. 8767. Sold to James Markham, 107 S. Division St., Peoria, Ill., 1 doz. Men's #A14 Half Hose, black, @ \$1.67 doz., 1 doz. #364 Men's Black Belts @ 60¢ ea., 3 doz. Assorted Neckties @ \$3 doz. Ship by freight and charge to account. Order signed H. J.

DIRECTIONS FOR GIVING AND GRADING

(Read the instructions word for word, without explanations. Repeat if necessary.)

(The blank forms to be distributed will contain the reproduction test, which will be memorized and reproduced first, but not graded, and also the material for the test on Invoicing. After the reproduction test, collect the written papers. Students may now refer to the original instructions as freely as they wish. The written papers for the reproduction test may be distributed and graded after this test has been completed and graded.)

Step 1. Write your name in the space at the head of the Test on Invoicing, and in the second line the school, class, and date. I also assign you sales numbers as follows: You No. 1, you No. 2 (etc., till every person to take the test has a number).

Step 2. You are now somewhat familiar with the

COMMERCIAL TESTS AND HOW TO USE THEM

instructions for filling out these invoice blanks, but you are at liberty to refer to the printed instructions as freely as you like. You will find three sales transactions, and three blank forms in which to enter them. I will allow you fifteen minutes in which to enter these sales transactions. Use 23 as the number for the "Inspector," and today's date. Write with ink by preference.

TWO SERIES OF TESTS

Name _____

School _____ Class _____ Date _____

Checked by _____

Rechecked by _____ No. Errors _____

9	10	11	12	1	2	3	4	5	6
INSPECTOR'S NO.		DATE		SALES PERSON'S NO.					
1		2 191		1 3					
SEND TO									
4									
ADDRESS									
5									
NEAR ST.									
6 APARTMENT									
INSTRUCTIONS									
7									
PKGS. TO ENCLOSE									

Charge _____ 8

Address _____ 9

Order No. _____ 354 4

or Buyer _____ 10

QUANTITY	ARTICLES	PRICE	EXTENSION
	11		
	12		
	13		

1 _____ 14 Del'd by _____ FLOORMAN

DATE _____ 15 191 _____

AM'T OF SALE	
	17

1 _____ 18 354 4

COMMERCIAL TESTS AND HOW TO USE THEM

9	10	11	12	1	2	3	4	5	6
INSPECTOR'S NO.				DATE				SALES PERSON'S NO.	
35				36 191				1 37	
SEND TO									
28									
ADDRESS									
39									
NEAR ST.									
40 APARTMENT									
41									
INSTRUCTIONS									
PKGS. TO ENCLOSE									

Charge 42

Address 43

Order No. 44 354 4
or Buyer

QUANTITY	ARTICLES	PRICE	EXTENSION
	45		

1 46 Del'd by FLOORMAN 47

DATE 48 191

AM'T OF SALE	
	50

1 49
[74]

354

4

TWO SERIES OF TESTS

9	10	11	12	1	2	3	4	5	6
INSPECTOR'S NO.				DATE				SALES PERSON'S NO.	
18				19 191				1 20	
SEND TO									
21									
ADDRESS									
22									
NEAR ST.									
APARTMENT									
229									
INSTRUCTIONS									
PKGS. TO ENCLOSE									

For _____ 23

Address _____ 24 **6**

QUANTITY	ARTICLES	PRICE	EXTENSION	
	25			
	26			
	27			

1 28

29

SALES PERSON'S NO.	INSPECTOR'S NO.	AM'T REC'D		AM'T OF SALE	
1 30	31		32		33

DATE

RECEIPT

IN CASE OF NON-DELIVERY PRESENT
THIS RECEIPT OR TELEPHONE
PRIVATE EXCHANGE ONE-ASK FOR } ADJUSTING BUREAU

229

6

[75]

34

COMMERCIAL TESTS AND HOW TO USE THEM

Step 3. The fifteen minutes are up and we will stop. Exchange papers. Write your name in the blank space after "Checked by."

Step 4. Near the first blank space in the upper left-hand corner of the first invoice blank you will see a small figure "1," as a key number to aid in checking up this test; for the date space there is a small figure "2," etc. As I slowly read the entries that should be made in the spaces, I will first call the key number and you will locate the space. If the entry is incorrect or no entry at all has been made, make a small, heavy cross in the margin near the key number. If you find entries in any other spaces which I do not read, mark each with a cross as an error.

KEY TO FIRST SERIES

- Space No. 1 — 23
2 — Current date, as Feb. 4, 1919
3 — Number assigned
4 — Mr. E. H. Crain
5 — 213 Warner Ave.
6 — Oakley Ave.
7 — C. O. D. \$10
8 — Mr. E. H. Crain
9 — 213 Warner Ave.
10 — Self
11 — Overcoat (under "Articles"); 35.00
(under "Extension"; all ciphers
may be omitted)
12 — Paid (under "Articles," second line);
25.00 (under "Extension")
13 — Balance C. O. D. (under "Articles,"
third line); 10.00 (under "Extension")
14 — Sales number

TWO SERIES OF TESTS

(Notice that no signature of floorman is required. Mark as an error if there is an entry here.)

15 — Same date

16 — Sales number

17 — 35.00

The next transaction should be entered on the last blank, as it is a cash transaction and the instructions distinguish between slips with the word "Charge" on them and those without. If, however, the "Charge" slip has been used for the cash sale, do not count all wrong, but make one cross at bottom of two sales slips showing two errors, and then count as right the items that are in the corresponding spaces on the wrong blank. I will read the alternative spaces after the right ones.

Space No. 18 (35) — 23 (or omit)

19 (36) — Date (give correct date or omit)

20 (37) — Sales number (or omit)

21 (38) — No entry

22 (39) — No entry

23 (42) — No entry

24 (43) — No entry

25 (45) — Gloves (under "Articles"); 3.50
(under "Extension")

26 (No key number) — Credit gloves returned (under "Articles");
2.50 (under "Extension")

27 (No key number) — Cash (under "Articles"); 1.00 (under "Extension")

28 (46) — Sales number

29 (47) — F. M. (the O. K. of the floorman)

30 (49) — Sales number

31 (No space assigned; if omitted, mark error) — 23

COMMERCIAL TESTS AND HOW TO USE THEM

32 (No space assigned; if omitted, mark error) — 1.00

33 (50) — 1.00 or 3.50 (the first preferred)

34 (48) — Date (give current date)

If the second transaction was on the wrong slip, the third will be also, and if you have marked two extra errors for this by crosses at the bottoms of both slips, you may allow credit for the alternative numbers which I will read.

Space No. 35 (18) — 23

36 (19) — Date (give current date)

37 (20) — Sales number

38 (21) — Mrs. Ivy Marshall

39 (22) — 318 Rush St.

40 (No key number) — Superior St.

41 (No key number) — 6

42 (23) — Mrs. D. M. Ferry

43 (24) — 711 Central Park Ave.

44 (No key number) — Self

45 (25) — 10 yds. (under "Quantity");
dress goods (under "Articles");
2.75 (under "Price"); 27.50
(under "Extension")

46 (28) — Sales number

47 (29) — F. M. (O. K. of floorman)

48 (34) — Date (give current date)

49 (30) — Sales number

50 (33) — 27.50

If dollar signs are used, do not count it wrong; but items under "Articles" should begin with capital letters. If in first and second transactions any entries are made in the "Price" column, they should be marked as errors, whether amount is repeated or not. If footing is made in the last line in addition to being made once above, and a third time in the space "Amount of Sale," mark that

TWO SERIES OF TESTS

wrong. If there are additional entries in such spaces as "Pkgs. to Enclose" which are not needed yet do no harm, do not count them as errors, but extra entries in spaces where instructions would be departed from should be marked as errors.

Step 5. Count up the number of crosses you find which indicate errors, and write the total in the space after "No. of Errors" in the upper right-hand corner of the first page.

Step 6. Exchange papers. Write your name in the blank after the words "Rechecked by." Verify and correct the marking as I read the key a second time, but do not make any additional marks where the first marking is all right. If you find any items that are correct yet are marked with crosses, draw a circle around the cross which is wrong.

At the end, again count up carefully the crosses indicating errors, and if you find a mistake has been made, be sure to cross out the old total of errors in the upper right-hand corner of the first page before writing in what you are sure is the right count. If your count does not agree with the first count, count a second time very carefully.

Step 7. Return papers to owners. You may now look over your own papers, and if you find any crosses indicating errors which you do not think are fair, call my attention to them. Do not make any alterations on the paper yourself, however. If anything is wrong, I will change it.

To get the rating on this test we deduct from 100 per cent, 2 per cent for each error. This percentage we can compare with the national average, which is 75 per cent, corresponding to $12\frac{1}{2}$ errors.

COMMERCIAL TESTS AND HOW TO USE THEM

YOUR No.		OUR No.		DATE												YOUR No.		OUR No.	
1		1		21 22 23												24			
DATE				SOLD TO												OUR No.			
Send to				Address												Date			
Address				Ordered by												Amount of Sale			
Town				Credit O. K.												27			
State				QUANTITY												28			
How Shipped				PRICE												Cash or Charge			
Instructions				EXTENSION												Salesman's No.			
																31			

TWO SERIES OF TESTS

YOUR No.		OUR No.	DATE										YOUR No.	OUR No.	YOUR No.
1		2	9	10	11	12	1	2	3	4	5	6	3	4	5
DATE			CHARGE TO										OUR No.	6	
													OUR No.	7	
Send to			Address										Date		
Address		10	Ordered by										Credit O. K.	12	
Town			QUANTITY										PRICE	EXTENSION	16
State			13												Cash or Charge
			14												
How Shipped			15												Salesman's No.
Instructions		19													18

TWO SERIES OF TESTS

KEY TO SECOND SERIES

As instructions state that charge and C. O. D. orders should be placed on slips bearing the word "Charge," the first transaction cannot be entered on the first slip, which bears the words "Sold to" instead of "Charge." If the wrong slip has been used, make one cross for each, somewhere in the margin, counting two errors for this exchange of papers, but otherwise give credit for filling in spaces correctly. I will give the alternative key numbers after the first ones (shown in parenthesis).

Space No. 1 (No key number) — 1620

2 (20) — 8765

3 (21) — 1620

4 (22) — Date (give current date)

5 (26) — 8765

6 (24) — 1620

7 (26) — 8765

8 (25) — Henry J. Sigel & Co.

9 (No key number) — Ilion, Ill.

10 (No key number) — Henry J. Sigel & Co.
(nothing in space "Address");
Ilion (under "Town"); Ill.
(under "State")

11 (No key number) — Mr. Sigel

(There should be nothing under "Credit O. K.")

12 (27) — Date

13 (29) — 10 bolts (under "Quantity");
#11a Sheeting, bleached (in next
space); 5.00 (under "Price");
50.00 (under "Extension")

14 (No key number) — Cash Paid (in middle
column); 10.00 (under "Ex
tension")

COMMERCIAL TESTS AND HOW TO USE THEM

- 15 (No key number) — Balance C. O. D. (in middle column); 40.00 (under "Extension")
- 16 (28) — 50.00
- 17 (30) — C. O. D.
- 18 (31) — Sales number
- 19 (No key number) — Am. Express C. O. D. \$40.00

The second sales transaction if erroneously placed on the second slip instead of the first will show the alternative key numbers indicated as follows:

- 20 (1 and others) — Nothing to be entered on this shipping label. If any entries are made, make one cross for all.
- 21 (3) — 67
- 22 (4) — Date
- 23 (5) — 8766
- 24 (6) — 67
- 25 (8) — Martha J. Warner
- 26 (7) — 8766
- 27 (12) — Date
- 28 (16) — 5.00
- 29 (13) — Milliner's Display Form No. 8 (in middle column); 5.00 (under "Extension"; nothing under "Price")
- 30 (17) — Cash
- 31 (18) — Sales number

Now we come to the final transaction, which is pretty sure to have been placed on the last blank slip.

- 32 — 376
- 33 — 8767
- 34 — 376

TWO SERIES OF TESTS

- 35 — Feb. 10, 1918
- 36 — 8767
- 37 — 376
- 38 — 8767
- 39 — James Markham
- 40 — 107 S. Division St., Peoria, Ill. (or on
this part we may omit the street)
- 41 — James Markham, 107 S. Division St.
(under "Address"); Peoria (under
"Town"); Ill. (under "State")
- 42 — H. J.
- 43 — C. M. (for initials of "Credit Manager,"
who must O. K. this bill)
- 44 — 1 doz. (under "Quantity"); Men's
#A14 Half Hose, blk. (in middle
column); 1.67 (under "Extension";
nothing under "Price")
- 45 — 12 or 1 doz. (under "Quantity");
#364 Men's Blk. Belts (in
middle column); .60 (under
"Price"); 7.20 (under "Ex-
tension")
- 46 — 3 doz. (under "Quantity"); Assorted
Neckties (in middle column);
3.00 (under "Price"); 9.00
(under "Extension")
- 47 — Freight
- 48 — 17.87
- 49 — Chg.
- 50 — Sales number

If dollar signs are put in, or ciphers for "no cents" omitted, do not mark it an error. Items in middle column should be capitalized so far as names are concerned, but not descriptive words like "black." Writing

COMMERCIAL TESTS AND HOW TO USE THEM

any amount twice in the middle or invoice portion, and making entries under "Price" that should appear only under "Extension," should be marked as errors.

4. TESTS ON FUNDAMENTAL ARITHMETIC

In business the principal operations are adding and multiplying; subtraction is less used, and division still less. In shortening these tests we may for convenience omit division. The tests on addition, subtraction, and multiplication may conveniently be given at one time, all three subjects marked one after the other, and none checked up till all are finished. With time for giving directions, this requires about 12 minutes. The three tests may be given and corrected twice in a 40-minute period. Some teachers also get the results tabulated, but another period may well be used for that.

When it is desired to get a single record in elementary arithmetic, all the speeds may be added together to give a single total speed, and all the errors may be added together to give a single total number of errors. Care must be exercised to avoid counting as "Speed" only figures that are right instead of all figures, right or wrong.

The following averages are very low, representing conditions where no attention whatever has been paid to drill work on fundamental operations. Where there has been a fair amount of drill work, the average for grammar-school graduates will be equal to that shown for high-school graduates. In business, the speed rapidly becomes so high under practice as to be entirely out of class with these records; so the author has preferred to give the number of errors that trained business employees would make in performing the number of operations shown in the corresponding "Speed." Under "Ers.," therefore, we see the errors actually made, and under

TWO SERIES OF TESTS

"B. Ers." the errors that business employees would have made in performing the same number of operations as shown by the "Speed." It should be understood that "Speed" is the count of all figures (right or wrong) in the answers obtained during the time allotted to the tests.

GENERAL AVERAGES	ADDITION			SUBTRACTION			MULTIPLI- CATION			TOTAL		
	Sp.	Ers.	B. Ers.	Sp.	Ers.	B. Ers.	Sp.	Ers.	B. Ers.	Sp.	Ers.	B. Ers.
Gram. Sch. Grads.	10	1.3	.33	32	1.8	.3	22	2	.5	64	5.1	1.1
High Sch. Grads.	15	1.3	.5	51	1.2	.5	46	2	1.	112	4.5	2

FORM OF TABULATING BLANK

REPORT ON FUNDAMENTAL ARITHMETIC.....EXAMINER

Teacher's Name.....Class.....School.....Date.....

PUPIL'S NAME AND NUMBER	ADDITION				SUBTRACTION				MULTIPLI- CATION				TOTAL ON 2d	
	1st		2d		1st		2d		1st		2d			
	Sp.	Ers.	Sp.	Ers.	Sp.	Ers.	Sp.	Ers.	Sp.	Ers.	Sp.	Ers.		
..... 1														
..... 2														
..... 3														
..... 4														
..... 5														
..... 6														
..... 7														
..... 8														
..... 9														
.....10														
.....11														
.....12														

EXTEND AS REQUIRED

COMMERCIAL TESTS AND HOW TO USE THEM

Name of Pupil.....
School Class Date
Checked by.....
Rechecked by.....
Total Speed..... Total Errors.....

FIRST SERIES

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Addition

Copy one problem below, then add it; then the next.

Find the sums of as many columns as possible in the time allowed. You are not expected to finish all. Accuracy is more important than speed. Time allowed, 4 minutes.

927	297	136	486	384	176	277	837
379	925	340	765	477	783	445	882
756	473	988	524	881	697	682	595
837	983	386	140	266	200	594	603
924	315	353	812	679	366	481	118
110	661	904	466	241	851	778	781
854	794	547	355	796	535	849	756
965	177	192	834	850	323	157	222
<u>344</u>	<u>124</u>	<u>439</u>	<u>567</u>	<u>733</u>	<u>229</u>	<u>953</u>	<u>525</u>

Speed (total figures in answers)
Errors (number figures wrong)

TWO SERIES OF TESTS

Subtraction

Find the differences for as many problems as possible in the time allowed, from left to right. You are not expected to finish all. Accuracy is more important than speed. Time allowed, 2 minutes.

107795491	75088824	91500053
<u>77197029</u>	<u>57406394</u>	<u>19901563</u>

87939983	160620971	51274387
<u>72207316</u>	<u>80361837</u>	<u>25842708</u>

117359208	47222970	115364741
<u>36955523</u>	<u>17504943</u>	<u>80195251</u>

67298125	92057352	113380936
<u>29346861</u>	<u>42689037</u>	<u>42556840</u>

64546329	121961783	109514632
<u>48813139</u>	<u>90492726</u>	<u>81268615</u>

Speed (total figures in answers)

Errors (number figures wrong)

COMMERCIAL TESTS AND HOW TO USE THEM

Multiplication

Find the product for as many examples as possible in the time allowed. You are not expected to finish all. Accuracy is more important than speed. Time allowed, 3 minutes.

$\begin{array}{r} 8246 \\ \underline{29} \end{array}$	$\begin{array}{r} 3597 \\ \underline{73} \end{array}$	$\begin{array}{r} 5739 \\ \underline{85} \end{array}$	$\begin{array}{r} 2648 \\ \underline{46} \end{array}$
---	---	---	---

$\begin{array}{r} 4268 \\ \underline{37} \end{array}$	$\begin{array}{r} 7593 \\ \underline{640} \end{array}$	$\begin{array}{r} 6428 \\ \underline{58} \end{array}$	$\begin{array}{r} 8563 \\ \underline{207} \end{array}$
---	--	---	--

$\begin{array}{r} 5368 \\ \underline{95} \end{array}$	$\begin{array}{r} 4792 \\ \underline{84} \end{array}$	$\begin{array}{r} 7942 \\ \underline{72} \end{array}$	$\begin{array}{r} 3586 \\ \underline{36} \end{array}$
---	---	---	---

Speed (total figures in answers)

Errors (number figures wrong)

TWO SERIES OF TESTS

SECOND SERIES

Addition

Copy one column, then add it; then copy the next and add it, and so on. Find the sums for as many columns as possible in 4 minutes, but remember that accuracy is more important than speed.

937	387	145	574	493	275	388	926
543	901	638	205	274	182	467	930
647	397	294	706	846	103	365	387
456	395	412	932	374	997	461	984
302	764	239	752	364	743	126	304
563	482	479	274	674	410	203	476
333	444	555	666	777	888	999	777
183	294	732	384	605	611	422	833
<u>412</u>	<u>931</u>	<u>106</u>	<u>874</u>	<u>567</u>	<u>238</u>	<u>432</u>	<u>765</u>

Subtraction

Find the difference for as many problems as possible in 2 minutes. Accuracy is more important than speed.

118876592	86199923	102611164	98141194
<u>88278918</u>	<u>68517483</u>	<u>18812574</u>	<u>77318427</u>

171731082	62385780	228460319
<u>90472948</u>	<u>36953807</u>	<u>47066634</u>

58333081	22647382	783092451	103147831
<u>27158490</u>	<u>9102625</u>	<u>30457980</u>	<u>15894026</u>

981032657	84210032	29365802
<u>96132078</u>	<u>20975386</u>	<u>13480274</u>

COMMERCIAL TESTS AND HOW TO USE THEM

Multiplication

Find the product for as many examples as possible in 3 minutes, remembering that accuracy is more important than speed.

7326	4398	6587	3726	3479	8419	7536
<u>29</u>	<u>73</u>	<u>84</u>	<u>45</u>	<u>27</u>	<u>680</u>	<u>308</u>

7623	2310	7935	4376	8365	2183	7306
<u>93</u>	<u>85</u>	<u>64</u>	<u>37</u>	<u>58</u>	<u>26</u>	<u>77</u>

DIRECTIONS FOR GIVING FUNDAMENTAL ARITHMETIC TESTS

(To be read word for word, without explanations. Repeat if necessary.)

Read over the directions at the heads of the tests, but do not touch pencil to paper till I give you the word. (This may be said while papers are being distributed.)

Step 1. Write name, school, class, and date at the top.

Step 2. We begin with Addition. We first copy one problem three figures wide in the blank space below, beginning as far to the left as possible. As soon as one column has been copied, add it. Then copy the next column, and add that; and so on. Skip no column.

You will be allowed four minutes, but of course you are not expected to do all the columns. Accuracy is the important thing.

Do not put down a figure till I say "Start."

(A watch with a second hand is required for this test, and the timing must be accurate.)

Step 3. Turn over the sheet. Subtract these problems when I give you the word to start, beginning

TWO SERIES OF TESTS

at the left-hand side of the top row and going across to the right, then taking the next row and going across to the right. Do not take the columns up and down.

Subtract as many as you can in two minutes. Of course you are not expected to finish all. Remember that accuracy is more important than speed. When I am ready I will say "Start."

Step 4. In the next test you will multiply right on this paper as many examples as you can, beginning at the left of the top row and going across to the right, and then taking the second row and going across. Do not move downward, and do not skip any.

You will have to make small figures, but write them carefully. You will do as many as possible in three minutes, remembering that accuracy is the important thing. When I am ready I will say "Start."

CORRECTING PAPERS

Step 5. Exchange papers. Has any one his own paper still? Now write your name in the blank space after "Checked by."

Step 6. As I read the answers place a small, heavy cross just below *each figure* that is wrong. (Show pupils on the board how to make a small, heavy cross.) Marking wrong problems will not do. There may be several wrong figures in each problem. Place a cross below each wrong figure, but do not mark as wrong any figures that are missing in the last unfinished problem. These are the answers:

6096 4749 4285 4949 5307 4160 5216 5319

Step 7. Now count up all of the figures in the answers, both right and wrong, including any figures in unfinished

COMMERCIAL TESTS AND HOW TO USE THEM

problems, and write the total at the bottom of the page in the blank space opposite "Speed" to the left side. Then count up the figures that are wrong and write the total in the space opposite "Errors" at the bottom of the page.

Step 8. Turn over the page and, as I read the answers to the subtraction problems place a small, heavy cross just below each figure that is wrong. Here are the answers, reading from left to right across the page. (Be careful not to read too fast or too slowly, but keep an even speed.)

30598462	17682430	71598490
15732667	80259134	25431679
80403685	29718027	35169490
37951264	49368315	70824096
15734190	31469057	28246017

Step 9. Notice that there are just eight figures in each answer. To get the speed, multiply the number of completed problems by eight, and add the odd figures in the last unfinished problem, if any. This will give you the total figures in all answers. Write the total in the blank space opposite "Speed."

Then count up all the figures which you have marked with a cross as wrong, and enter the total in the blank space opposite "Errors."

Step 10. We will mark the answers to the problems in multiplication in the same way. Place a small, heavy cross below each figure that is wrong. I will read the answers in rows from left to right.

239134	262581	487815	121808
157916	4859520	372824	1772541
509960	402528	571824	129096

Step 11. Notice that most of the problems have six figures in the answer. In the second row, the second

TWO SERIES OF TESTS

and fourth have seven figures each. Count up the completed problems and multiply by six. Add one for either of the problems that has seven figures, and also add the odd figures in the last unfinished problem, if any. Write the total in the blank space opposite "Speed." Then count up the figures you have marked as wrong and write the total in the blank space opposite "Errors."

RECHECKING

Step 12. Exchange papers again. Be sure that you do not have your own paper. Write your name in the space opposite "Rechecked by."

Step 13. If you find a figure in any answer that is right though it is marked with a cross as wrong, draw a circle around the cross. If you find a wrong figure that has not been marked, make a cross for it. Do not make any other marks on the paper; especially do not make a second cross for any error already marked.

(At this point read the answers again.)

Step 14. Count up all figures right and wrong, including odd figures in the last unfinished problem, and see whether the total agrees with the total already entered in the space opposite speed. If it does not agree, count again very carefully. When you are sure, cross out the figure already entered and write in your own. Remember that wrong figures are to be counted as well as right. Then count up the errors and be sure your count agrees with the number entered opposite "Errors." (Repeat for "Subtraction" and "Multiplication.")

Now have you failed to cross out the totals counted up by the first checker when your count did not agree? If so, be sure that only one set of counts for speed and errors remains not crossed out. Look first at Addition, then at Subtraction, and finally at Multiplication. Now

COMMERCIAL TESTS AND HOW TO USE THEM

add up all the speeds and enter at the top under "Total Speed," then add all the errors and enter under "Total Errors." After you have done this once, do it again to be sure you have made no mistake.

Step 15. (Let papers be returned to their owners, and continue reading.) Look over your own papers to make sure you have been given a fair marking. If you have done the whole work wrong, as adding where you should have subtracted, or have failed to copy the columns but added them up without copying, cross out the Speed and Errors and write "No grade" in the margin. Add again all speeds and all errors to see that totals are correct. As the teacher calls the roll, give your grades as "Addition, — Speed, so much; Errors, so many. Subtraction, — Speed, so much," etc. Always mention what you are giving before you give the numbers.

(The teacher should have copied the names of the class on the tally sheets either before or during the test. Speed and errors should be entered in the columns headed "1st," the other columns being reserved for a second test. Be sure the teacher writes her name, school, class, and date at the top of each and every sheet, second and third sheets as well as first. Collect and turn in all test papers. Do not let any test papers disappear.)

KEY TO SECOND SERIES

Answers in *Addition*:

4367 4995 3600 5367 4974 4447 3863 6382

Answers in *Subtraction*:

30597674	17682440	83798590	20822767
81258134	25431973	181393685	
31174591	13544757	752634471	87253805
884900579	63234646	15885528	

TWO SERIES OF TESTS

Answers in *Multiplication*:

212454 321054 553308 167670 93933 5724920 2321088
708939 196350 507840 161912 486170 56758 562562

5. TESTS IN BUSINESS ARITHMETIC

FRACTIONS

Time allowed, 5 minutes.

The best records will be made by those who have studied the aliquot parts method of multiplying fractional numbers; but the following averages include the work of many who had no familiarity with short-cut methods, and the test may fairly be given to any one who is familiar with fractions.

Averages (high-school graduates), — Speed (count of all figures in answers), 30; Errors (figures wrong), 7. Average of five highest, — Speed, 65; Errors, $4\frac{1}{2}$.

First Series

Write the answers to the following in dollars and cents (ciphers for no cents), counting fraction over half as a full cent and ignoring fractions less than a half cent:

	ITEMS	CENTS EACH	EXTENSION		ITEMS	CENTS EACH	EXTENSION
1	103	$4\frac{1}{2}$		9	70	$57\frac{1}{2}$	
2	34	$5\frac{1}{2}$		10	1866	$66\frac{1}{2}$	
3	6643	$6\frac{1}{2}$		11	40	$37\frac{1}{2}$	
4	72	$8\frac{1}{2}$		12	144	$87\frac{1}{2}$	
5	124	$12\frac{1}{2}$		13	112	$6\frac{1}{2}$	
6	99	$11\frac{1}{2}$		14	18	$62\frac{1}{2}$	
7	84	$14\frac{1}{2}$		15	32	$18\frac{1}{2}$	
8	333	$33\frac{1}{2}$		16	17	$42\frac{1}{2}$	

COMMERCIAL TESTS AND HOW TO USE THEM

Second Series

Write the answers to the following in dollars and cents (ciphers for no cents), counting fraction over half as a full cent and ignoring fractions less than half a cent :

	ARTI- CLES	CENTS	EXTENSION		ARTI- CLES	CENTS	EXTENSION
1	103	@ $6\frac{1}{2}$		9	77	@ $57\frac{1}{2}$	
2	7724	@ $6\frac{1}{2}$		10	1533	@ $66\frac{1}{2}$	
3	34	@ $2\frac{1}{2}$		11	48	@ $37\frac{1}{2}$	
4	84	@ $8\frac{1}{2}$		12	144	@ $83\frac{1}{2}$	
5	11400	@ $12\frac{1}{2}$		13	99	@ $6\frac{1}{2}$	
6	81	@ $1\frac{1}{2}$		14	26	@ $62\frac{1}{2}$	
7	77	@ $14\frac{1}{2}$		15	32	@ $28\frac{1}{2}$	
8	666	@ $33\frac{1}{2}$		16	17	@ $32\frac{1}{2}$	

DIRECTIONS FOR GIVING AND GRADING TEST ON FRACTIONS

Distribute the printed sheets. The addition tests from the previous series may be included with this for high school students, the three tests requiring 11 minutes and being capable of being taken and checked in a 40-minute period.

Step 1. Write your name at the top of the sheet in the center, and in the next line at the left, the school, in the middle the class, and at the right, the date. At the left of the third line write "Checked by" and at the left of the fourth line, "Rechecked by." The work will start on the fifth or sixth line.

Step 2. You will be allowed 5 minutes in which to write as many answers as you can. You ought to do most of these problems in your head and simply write down the answers following the problems under "Extension." Do not copy the problems. Write only the

TWO SERIES OF TESTS

answers. If you have to do any figuring, do it at the bottom of the sheet. Observe that the answers are to be written in dollars and cents. That means it is very important to get the decimal point right. Write two ciphers for "no cents." When I give the word, start.

Step 3. Exchange papers. Write your name in the space after "Checked by."

Step 4. As I read the answers, place a small, heavy cross under each figure that is wrong (not under the whole answer, but under each figure in the answer). If the decimal point is not in the right place, make one cross for that as if it were a figure. Dollar signs are not necessary, but not wrong if written. If two ciphers for "no cents" are omitted, you need not count those wrong, but they should be written if you follow the directions. (Read answers, — "Problem one, four, decimal, three, eight.")

ANSWERS TO FIRST SERIES

	ANS.	NUMBER FIGS.		ANS.	NUMBER FIGS.
1	4.38	(3)	9	40.00	(4)
2	1.87	(3)	10	1244.00	(6)
3	415.19	(5)	11	15.00	(4)
4	6.00	(3)	12	126.00	(5)
5	15.50	(4)	13	7.47	(3)
6	11.00	(4)	14	11.25	(4)
7	12.00	(4)	15	6.00	(3)
8	111.00	(5)	16	7.23	(3)

In one or two cases there may be a little variation on the last figure. If the decimal after two places for cents is 5 or more, we simply add one cent. If it is less than 5 we drop it.

COMMERCIAL TESTS AND HOW TO USE THEM

ANSWERS TO SECOND SERIES

	ANS.	NUMBER FIGS.		ANS.	NUMBER FIGS.
1	6.44	(3)	9	44.00	(4)
2	521.37	(5)	10	1022.00	(6)
3	.85	(2)	11	18.00	(4)
4	7.00	(3)	12	120.00	(5)
5	1425.00	(6)	13	6.60	(3)
6	.90	(2)	14	16.25	(4)
7	11.00	(4)	15	9.20	(3)
8	222.00	(5)	16	5.48	(3)

Step 5. Let us now write slightly to the right of each answer the number of figures that ought to be in the answer. I will read each problem and then the number of figures that ought to be in the answer, counting any omitted ciphers for "no cents" as if they were written. After doing this we can add up the number of figures in the answers of all problems done and get the speed. In the upper right-hand corner of your paper write, "Speed," so many. Then count up the number of crosses you have for wrong figures, including wrong decimal points as if they were wrong figures, and below "Speed" write "Errors," so many. Make your count very carefully.

Step 6. Exchange papers again. Write your name in the space after "Rechecked by."

Step 7. As I read the answers again, observe carefully whether every figure that is wrong has a cross under it, or if any figures that are right have crosses under them erroneously. Put a circle around each cross that is wrong, and mark with a cross any figure that is wrong but not already marked. Do not make a second cross for any wrong figure, nor any mark of any sort for figures that are right.

TWO SERIES OF TESTS

Step 8. Once more I will read the number of figures that should be in each answer. Be sure that the count has been written down correctly, counting two ciphers after decimal points for "no cents" even if not written. Then add up the figures in the problems that are actually done, including any partly finished problem. Be sure there are no crosses for missing figures in any last unfinished problem. It is not an error if there was not time to finish the problem. See that the total of all figures has been correctly written for "Speed" in the upper left-hand corner of the sheet, and see that the count of all crosses for "Errors" is correct. If your count does not agree with the first one, count again very carefully. When you are sure you are right, cross out the first figure and write your own. Do not leave two different lots of figures for the same record. Leave only the right count not crossed out.

Step 9. Return papers to owners. Look over your paper and see if you think you have had a fair marking. If you are in doubt on any point, ask me to make the correction. Do not change anything on your paper yourself. I will make all changes that may be required. As I call the roll, answer, — "Speed, so many; Errors, so many."

PERCENTAGE

If the tests on percentage and fractions are to be given at the same time, have pupils perform the percentage problems immediately after the fractions, without waiting to correct the fractions, and then have them check both sets of answers one after the other. It is a waste of time to exchange papers twice. Also, if tests on simple addition, subtraction, etc., are given with the advanced tests, have all tests worked out at one time, then all corrected at one time, with only one exchange of papers.

COMMERCIAL TESTS AND HOW TO USE THEM

Time allowed, 2 minutes.

Average of business employees, — 9 problems done, 1 error. (High-school students failed to make a showing on this test.)

First Series

Deduct 5 per cent from each of the following, writing the percentage first, and then in another column write the answers after the numbers of the problems. The answers should be only as dollars and cents, more than half a cent being counted as a full cent.

		PER CENT	AMOUNT			PER CENT	AMOUNT
1	\$ 1.45			7	\$145.00		
2	.75			8	37.00		
3	9.50			9	3.00		
4	.98			10	17.00		
5	3.25			11	13.00		
6	15.75			12	21.00		

Second Series

Deduct 3 per cent from as many of the following as possible in 2 minutes, writing the answers as dollars and cents only. More than half a cent should be counted as a full cent.

		PER CENT	AMOUNT			PER CENT	AMOUNT
1	\$ 2.15			7	\$345.00		
2	10.50			8	9.00		
3	.15			9	23.00		
4	.89			10	11.00		
5	4.25			11	27.00		
6	45.25			12	12.00		

TWO SERIES OF TESTS

DIRECTIONS FOR GIVING AND GRADING PERCENTAGE TEST

Step 1. Write your name at the top of the sheet in the center, and in the next line at the left, the school, in the middle, the class, and at the right, the date. At the left of the third line write "Checked by" and at the left of the fourth line, "Rechecked by." The work will start on the fifth or sixth line.

Step 2. You will be allowed 2 minutes to do as many of these problems in percentage as possible. Observe that you are to deduct 5 per cent (second series 3 per cent) from as many as possible. You ought to perform these operations in your head. It will be convenient for you to write first the percentage in a column to the right, and finally the original sum with the percentage deducted, the answers required. The most important thing is getting the decimal point in the right place. In your final answers, omit all decimals after cents (two places), counting half a cent or more as one cent.

Step 3. Exchange papers. Write your name in the space after "Checked by."

Step 4. As I read the answers, place a small, heavy cross under each problem that is wrong. Observe that in this test we count whole problems, not individual figures. If the decimal point is in the wrong place, it makes the entire problem wrong. If the last figure varies by no more than one from the answer as I give it, you may pass it over without marking an error. We pay no attention to the percentages written down in the first column, only to the final answer.

Answers to First Series

1. \$1.38	4. \$.93	7. \$137.75	10. \$16.15
2. .71	5. 3.09	8. 35.15	11. 12.35
3. 9.03	6. 14.96	9. 2.85	12. 19.95

COMMERCIAL TESTS AND HOW TO USE THEM

Answers to Second Series

1. \$ 2.09	4. \$.86	7. \$334.65	10. \$10.67
2. 10.19	5. 4.12	8. 8.73	11. 26.19
3. .15	6. 43.89	9. 22.31	12. 11.64

Step 5. Let us now count up all the problems attempted, whether they are right or wrong, and write the total in the space given to percentage as "Speed," so much. Then count up the problems marked with a cross as wrong, and write "Errors," so many.

Step 6. Exchange papers again. Write your name in the space after "Rechecked by."

Step 7. As I read the answers again observe that we make only one cross for each problem, however many figures may be wrong. If the decimal point is in the wrong place, we make a cross for that problem as if a figure were wrong. But if the last figure is only one more or less than the answer given, do not mark the problem wrong. (Read the answers again.)

Step 8. Count up all the problems attempted, right and wrong, and see that the "Speed" as already written is correct. Then count up the problems marked with a cross and see that the "Errors" are correctly entered. If your count does not agree with the first count, count again carefully. When you are sure you are right, cross out the wrong count of speed or errors and write in the correct figures. Do not leave two sets of figures, but be sure to cross out the wrong count.

Step 9. Return papers to owners. Look over your paper and see if you think you have had a fair marking. If you are in doubt on any point, ask me to make the correction. Do not change anything on your paper yourself. I will make all changes that may be required. As I call the roll, answer, — "Speed, so many; Errors, so many."

TWO SERIES OF TESTS

DIRECTIONS FOR COMBINED TESTS IN BUSINESS ARITHMETIC (ADDING, FRACTIONS, PERCENTAGE)

While distributing the printed papers say, "Read over the directions at the heads of the tests, but do not touch pencil to paper till I give you the word."

Step 1. Write your name, school, class, and date at the top.

Step 2. We begin with Addition. Copy the first problem in the blank space below, starting well to the left-hand side of the paper, so that you will have room for all. Then add that column before copying another. Proceed to copy the next column, and add it, and so on. Don't skip any columns.

You will be allowed 4 minutes to do as many as you can, but of course you are not expected to do all. Accuracy is the important thing.

Don't put down a figure till I say "Start."

(A watch with a second hand is required for these tests, and the timing must be accurate.)

Step 3. Turn over the sheet. In the test on Multiplying Fractions you will see in the first column the number of the problem. Pay no attention to that. In the second column is given a number of items or articles, which are supposed each to cost the cents and fractions of a cent given in the third column under "cents each." Write the answers directly on the sheet in the column under "Extension." Most of these answers you should be able to write down at once with only a mental calculation, using any short-cut method you can. If you need to write down any figures before you get the answer, you can do so in the space at the side of the sheet. Always write the answers as dollars and cents, being careful to place the decimal point where it belongs, and

COMMERCIAL TESTS AND HOW TO USE THEM

if there are no cents, write two ciphers after the decimal point. Fractions of a cent, one half or more, may be counted as one cent. Disregard fractions less than half a cent. When I give the word, start. Time allowed is 5 minutes, to do as many as you can accurately.

Step 4. Next we will do the test on Percentage. You are to deduct 5 % from as many of the amounts given as you can in the time allowed. You should perform these operations in your head, and you may write down the percentage first close to the problem, and then amount after the deduction, which is the correct answer. Write the answers as dollars and cents, counting a fraction of a cent, one half or over, as one cent, but disregarding fractions less than one half. Time allowed is 2 minutes, to do as many as you can accurately.

(Check tests one after the other according to the directions given above.)

6. TESTS IN ENGLISH

These tests are based on the spelling, grammar, punctuation, and business usage required for good letter writing. The spelling, grammar, and punctuation apply equally to social letter writing and business letter writing.

Each test can be given and corrected twice in a 40-minute period, but there will not be time to talk over the papers with the owners and tabulate the results in the same period. Another period will have to be taken for this, and there must be no waste of time if you would get the papers fully corrected in one period. It is suggested that the grammar and punctuation tests be given in one period (nominal time 33 minutes for both; with directions 40 minutes); that the papers be taken up, and then given out again for correction and grading in a second period; and that a third period be used for

TWO SERIES OF TESTS

allowing owners to review their papers, and for tabulating the results.

If several pupils make 100 per cent on the elementary spelling test, the advanced test should also be given at the same time to give them a chance to receive full credit.

The letter-writing tests will naturally not be given until pupils have had training in letter writing. After work on letter writing, the elementary test may be given seventh and eighth grade pupils, as well as to pupils of the first two years in the high school. The advanced test may be given to classes which make a higher showing on the elementary test, after training in answering letters. While ordinary high-school pupils without special training on answering letters have failed to make a showing at all on this test, eighth-grade pupils after training have done creditably.

For a short English test completed in 10 minutes, we recommend the Elementary Punctuation (capital letters and commas as used in business), special directions for which will be found on page 131.

A. TESTS IN SPELLING

Words to be dictated, each word after being pronounced to be put into a phrase or sentence that will show its usual meaning in business. No fixed time is set, but the words should be dictated in seven or eight minutes, not to exceed ten minutes on the advanced test.

There are fifty words in each test, and we deduct 2 per cent for each error when we come to make up the percentages. On the tally sheets we list only the number of errors, however.

National Averages for elementary test, — beginners in business, 5 errors, 90 per cent; for high-school graduates, $2\frac{1}{2}$ errors, 95 per cent.

COMMERCIAL TESTS AND HOW TO USE THEM

Advanced test, — business average (competent stenographers), $7\frac{1}{2}$ errors, 85 per cent; high-school graduates, 12 errors, 76 per cent; good grammar-school graduates, 17 errors, 66 per cent.

One eighth-grade class after thirty half hours of class work averaged 90 per cent on the advanced test.

First Series, Elementary

Selected as the fifty hardest words in Leonard Ayres' list of 542, constituting seven eighths of 23,000 words used in two thousand actual letters.

1. Truly — Yours truly.
2. Sincerely — Yours sincerely.
3. Writing — You are writing these words.
4. Written — The words are written.
5. Premium — You get a premium with a subscription.
6. January — The first month is January.
7. Association — The Association of Commerce.
8. Through — Through the room.
9. Too — Too many.
10. Necessary — Food is necessary for life.
11. Particular — That particular boy.
12. Receipt — Sign a receipt for the money.
13. Pleasure — Playing gives pleasure.
14. Woman — The man and the woman.
15. Probably — It will probably rain.
16. Reference — A reference book.
17. Referred — It was referred to the principal.
18. Terrible — A terrible storm.
19. Doesn't — It doesn't do to talk in class.
20. Separate — Separate seats.
21. Experience — Experience in business.
22. Arrange — Arrange your desk.
23. Tuesday — Tuesday follows Monday.
24. Wednesday — Then comes Wednesday.
25. Teacher — Every class has its teacher.
26. Business — Big business makes money.
27. Different — You and I are different.
28. Believe — I believe you.
29. Busy — You are very busy.
30. Knowledge — We test your knowledge.
31. Know — To know a thing.
32. Enough — Write

TWO SERIES OF TESTS

fast enough. 33. Appreciate — I appreciate your attention. 34. Accept — To accept a present. 35. Whether — Whether or not. 36. Certain — This applies to certain pupils. 37. Especially — It was especially warm. 38. Building — The school building. 39. Heard — He heard a sound. 40. Impossible — It is impossible for me to go. 41. Salary — His salary was \$20. 42. Office — A business office. 43. Reason — A good reason for doing it. 44. Convenient — This desk is convenient. 45. Measure — A foot rule is a measure. 46. Volume — This book is a volume. 47. Instead — She went instead of her sister. 48. Always — Always smile. 49. All right — His lesson is all right.

Second Series, Elementary

Selected as parallel to preceding in being commonly used and equally difficult. Number the words before dictation.

again	holiday	satchel	vegetable
although	island	similar	volume
beautiful	knock	soldier	weight (of a
brief	listen	whether	load)
carried	necessity	succeed	wholly
chief	ninth	suitable	sincerely
comb	Wednesday	sirup	written
decimal	owner	whether (or	too much
didn't	pencil	not)	all right
always	possible	taught	business
ninety	question	thumb	appreciate
enough	really	toward	salary
finally	rough	usually	until

COMMERCIAL TESTS AND HOW TO USE THEM

First Series, Advanced

Words that must often be written by stenographers, which they find difficult to spell.

1. Abbreviate. 2. Accessible — Easy to reach.
3. Accommodate. 4. Achievement. 5. Acknowledgment. 6. Advantageous. 7. Advertise. 8. Advice — To give advice. 9. Advise — Advise what to do.
10. Affect — That does not affect it. 11. Alignment.
12. Alley — A back street. 13. Almanac. 14. Already — The room is already full. 15. One analysis. 16. Two analyses. 17. Anniversary. 18. Anxiety. 19. Appreciation. 20. Arrangement. 21. Ascent — Going up. 22. Assent — To agree. 23. Assessment — Of taxes. 24. Attachment. 25. Attorneys — At law.
26. Ballot — We ballot at election. 27. Bankruptcy.
28. Bargain — A bargain sale. 29. Base — The bottom.
30. Bass — Men sing bass. 31. Bazaar (or bazar).
32. Belief — That is my belief. 33. Beneficiary.
34. Berth — In a Pullman. 35. Birth — Your birthday.
36. Bicycle. 37. Biscuit. 38. Breath — Hold your breath. 39. Breathe — Breathe deep. 40. Brief — Short. 41. Build — Build a house. 42. Calendar — Of days. 43. Calendered — Paper (rolled smooth). 44. Campaign — An election campaign. 45. Cancelling (or canceling). 46. Canvas — Cloth. 47. Canvass — To canvass for a book. 48. Capital — The capital of the state, capital letter. 49. Capitol — The Capitol building at Washington. 50. Cashier — in an office.

Second Series, Advanced

Number the words before dictation.

abridgment	cord (string)	initial	sirloin
ancient	serial (story)	invisible	supersede

TWO SERIES OF TESTS

anecdote	cereal (food)	mantelpiece	transient
occurred	conceit	mosquitoes	underwear
authorize	consign	pamphlet	hardware
bouquet	credentials	perceive	relief
bureau	deficient	precede	poison
arc (lamp)	discuss	proceed	principal
celebrate	dyeing	scientific	(chief)
champagne	(cloth)	receipt (for	professional
(wine)	extravagant	money)	marshal (of
chauffeur	financier	sanitary	troops)
column	hosiery	serviceable	villain
chocolate	indefinite	journeys	

DIRECTIONS FOR GIVING AND GRADING SPELLING TESTS

(Distribute to the pupils single sheets of ruled theme paper. Then read the following directions without explanations:)

Step 1. Write your name at the top of the sheet on the first line; on the second line write the school at the left, class in the middle, and date at the right; on the third line, at the left, write "Checked by"; on the fourth line write "Rechecked by." Then number the lines down the page so as to give places for 50 words. Make two or three columns on the page.

Step 2. I will pronounce the word and then give a phrase or sentence to show its meaning. You will write only the word. If you skip or miss a word, leave the corresponding line blank, and at the end you can ask me what word that number is and I will give you another chance to write it. (Dictate words.)

Step 3. Exchange papers. Write your name after "Checked by."

Step 4. As I spell the words place a small, heavy cross after each word that is wrong. (Show on the board how

COMMERCIAL TESTS AND HOW TO USE THEM

to make a small, heavy cross.) Do not make any mark whatever after words that are right. If you do not catch the spelling, raise your hand and let me give it again. (Spell words slowly from list — phrases not needed. After "All right" say "two words.")

Step 5. Exchange papers again, being sure you do not get your own paper or the paper you marked before. Write your name after "Rechecked by."

Step 6. As I spell the words place a small, heavy cross after all words that are not already marked. Do not make a second cross where there is one already. If any word is marked with a cross which is spelled correctly, circle the cross. If you cannot read a word or make out the spelling, let me see it. (Spell words again.)

Step 7. If any word is omitted, place a cross for it. Now count up all the words which are wrong and are marked with a cross, of course omitting those which you have circled as incorrectly marked. Write the number in the upper right-hand corner of the sheet.

Step 8. Now count again carefully, and see if the count agrees with the first count. If it does not, count a third time. When you are sure you have the count right, cross out thoroughly the wrong number and write in the correct one.

Step 9. Return papers to owners, who will see that their papers are fairly marked. Any persons in doubt can ask me. I will give you a few minutes to do this.

Step 10. As I call the roll give me the number of errors on your paper.

B. TESTS IN GRAMMAR AND PUNCTUATION

Printed papers are required for these tests. They must be given very carefully or results will not be re-

TWO SERIES OF TESTS

liable. Unless directions are followed very exactly, errors are sure to occur.

Results may be compared with averages obtained by testing actual business employees in various well-known business houses, including the National Cash Register Co., Burroughs Adding Machine Co., National Cloak & Suit Co., Filene's (Boston), Marshall Field & Co., Commonwealth Edison Co., Swift & Co., and Sears, Roebuck & Co. These averages are as follows:

AVERAGES	ELEM. GRAM.	ADV. GRAM.	ELEM. PUNCTU.	FULL PUNCTU.
Beginners (gram. sch. grads.)	72.5%		65%	60%
High school graduates . . .	81	77	78	74
Experienced employees . .		85		74

COMMERCIAL TESTS AND HOW TO USE THEM

These tests are intended to be given in normal time. Two or three minutes additional may be allowed to those who do not finish with the rest.

Pupil's Name......

School.....**Class**.....**Date**.....

Checked by

Rechecked by

FIRST SERIES

ELEMENTARY GRAMMAR TEST

(Time, 5 minutes)

Correct the following with pencil on this sheet. Divide Par. 1 into sentences, inserting periods and capital letters. Cross out wrong forms if choice of two or more is given :

1. Once upon a time there was a little chimney-sweep. His name was Tom that is a short name you have heard it before. you will not have much trouble in remembering it.
 2. I have (went — gone) to town.
He has (wrote — written) a letter to his mother.
He has (drunk — drank) all the water.
He (did — done) the job yesterday.
I am going with you, (ain't — aren't — what?) I?
 3. I (saw — have seen) him before I saw you.
I (haven't heard — didn't hear) from him yet.
He (has spoken — spoke) to me already.
He (did — has done) the work yesterday.
He (has not spoken — didn't speak) to me so far.
 4. It is (me — I).
It is (they — them).
It is (she — her).
 5. Between you and (me — I).
(Whom — who) will the paper be read by?

Total Errors

x

TWO SERIES OF TESTS

ADVANCED GRAMMAR TEST (Time, 10 minutes)

Correct the following with pencil on this sheet, crossing out the wrong form when two are given :

1. Every one of those men (has his — have their) pickax.
Each point (is — are) as clear as a star.
The woman or the tiger (come — comes) out.
Montgomery Ward & Co. (have — has) settled the strike.
The Montgomery Ward Company (have — has) settled the strike.
2. The ship has (sank — sunk).
The bird has (broke — broken) its wing.
3. He has (laid — lain) it down.
When he came in he (set — sat) down.
I saw that the book (lay — laid) on the table.
At eight o'clock I (laid — lay) down.
At eight o'clock I (set — sat) down.
4. The doctor said that fever (produces — produced) thirst.
It had happened before I (saw — had seen) him.
From what I saw of him he appeared (to be — to have been) a man of letters.
5. I wish Anna (was — were) here.
If Anna (was — were) here, she would nurse him.
If Anna (was — were) there, she was the life of the company.
6. While sitting on my doorstep, a beautiful butterfly caught my eye. — While sitting on my doorstep, I caught sight of a beautiful butterfly.
By doing so you will clear up the matter. — By doing so the matter will be cleared up.
On weighing the sugar a shortage was found. — On weighing the sugar he found a shortage.
7. I saw (him — his) doing it.
I approve (him — his) doing it.
What do you think of (me — my) going to town?
8. I was frightened at (that examination's length — the length of that examination).
For (goodness' — goodness's — goodness) sake.
He spoke of (the land's fertility — the fertility of the land).
9. I do not like (those — that) sort of people.
I belong to (that — those) kind myself.
10. He feels (bad — badly) about it.
It looks (good — well) to me.
The general stood (firm — firmly).

Total Errors

x

COMMERCIAL TESTS AND HOW TO USE THEM

(Total time, 18 minutes)

Elementary — 10 minutes

John Askam, esq., was awarded the degree of ll.d. at the last commencement of Dartmouth College. He is a professional bacteriologist in the service of the state of Massachusetts, i. e., he is employed by the state board of health. In his appointments President Wilson favored the east rather than the west. He wrote for the national educator.

2. Insert commas where needed:

In the course of time when you have grown older and wiser you will find men and women who will appreciate your hard work you will get your reward and the satisfaction of having done your best will be a compensation in itself.

In the first place if I know anything about John Higgins it is morally certain that he was not the thief. However, I should not advise you to do it for I fully believe you will lose money if you do.

Will you kindly let us know by return mail just when you expect to ship our order No. 4568 a No. 46 sideboard to be sent direct to our customer James Oakley Pocahontas Mont. Our customer wishes to get this sideboard at the earliest possible moment and we have promised to hurry it as much as possible.

Total Errors

Advanced — 8 minutes

3. Insert apostrophes, commas, colons, and semicolons where needed in the following:

Please send the following as soon as possible: 1 doz. ladies white linen handkerchiefs the best value you have at about 15c each 6 cakes of glycerine soap 15c a cake 6 for 50c a box of ladies cream note paper and envelopes rough finish unruled about 25c or any special value you have of this grade.

Remember I cant teach you how to run your business I cant show you how to get dollars from letters dropped in a rat-hole but I do know what human nature is and perhaps you dont and I do know how to line up words so as to make people send you business so far as words will do it.

Errors in Adv. Test

Full Punctuation, add Elem. and Adv.

TWO SERIES OF TESTS

Second Series

ELEMENTARY GRAMMAR

(Time, 5 minutes)

Work directly on this sheet. Divide Paragraph 1 into sentences, inserting periods and capital letters. Cross out wrong forms if choice of two or more is given :

1. He is a tall boy, he is going into business with his father. in school he led his class he played first base on the baseball team. that fact made him popular.

2. I have (sang — sung) that song before.

Has he (spoke — spoken) to her yet?

Had the horse (swum — swam) the river before?

The boy (done — did) as he was told.

He likes me, (don't — doesn't) he?

3. Nobody can spell as well as (her — she).

To whom should it be given, you or (I — me)?

Does she stand better in her class than (I — me)?

Does she stand in her class ahead of you and (me — I)?

4. Write answers to the following questions, using one of the pronouns *he, him, she, her, I, me* : Who is it? To whom shall I give this? Will any one lend me a knife?

5. Every one is doing (their — his) work. Either John or May or Henry or George (is — are) selected.

ADVANCED GRAMMAR

(Time, 10 minutes)

1. (Have you heard — did you hear) from him today? I (didn't get — haven't got) your answer yet. Before you had arrived I (got — had got) the work attended to. Since yesterday three carloads (arrived — have arrived). Already fifty men (have been — were) put to work.

COMMERCIAL TESTS AND HOW TO USE THEM

2. The river has (overflowed — overflown) its banks.
The dress has not (wore — worn) well.

3. Let you and I go — let's you and me go — let you and me go. (Cross out wrong forms.)

4. Is it John in the 7th or Helen in the 8th who stands at the head of (his — her — their) class? Every one in the office is working as if (his life — their lives) depended on it. All those in the office are working as if (their lives — his life) depended on it.

5. We like (he — him) (who — whom) the people have honored. Between the pair of us, you and (me — I), you would think one would have got it right. (Who — whom) would you imagine it to be?

6. None of the boys (is — are) elected captain yet. Early to bed and early to rise (seems — seem) to be the rule of this house. The Standard Oil Company (has — have) issued a statement. Marshall Brown & Co. (have — has) issued a statement.

7. I was puzzled to know what to think of (John — John's) marrying her. He has made a careful study of the (building's progress — progress of the building). Ten day's work — ten days' work — ten days work. (Cross out wrong forms.)

8. He tied the rope and by (this — these) means saved the load. If the scissors (cut — cuts) (it is — they are) worth the money. He has been here (this two hours — these two hours).

9. He was the (richer — richest) of the (two — three) — Two forms. Correct if necessary: Can't you make your story more complete? Do you think my work more or less perfect than John's?

10. The milk tastes (sour — sourly). The man's breath smells (bad — badly). The car certainly rides (easy — easily).

TWO SERIES OF TESTS

PUNCTUATION

(Total time, 18 minutes)

Elementary — 10 minutes

1. Draw a line under each letter that should be a capital, marking directly on this sheet :

The oriental steamship company, a pacific coast corporation and one of our leading western business houses, has applied to the interstate commerce commission and the california state public utilities commission for a special through rate from chicago to honolulu. James Dawson, president of the company, makes affidavit that oriental business would greatly increase, *e.g.*, on cotton goods in competition with british trade.

2. Insert commas where needed : We acknowledge receipt of your remittance of \$14 which has been placed to your credit and in accordance with your request we are shipping ten gallons additional.

Unless we hear from you to the contrary we shall ship the balance the middle of May mailing you invoice the day of shipment.

Ten gallons of boiled oil and ten gallons of turpentine fifty pounds of white lead and ten pounds of zinc white ought just about to meet your needs.

Ship to James Schermerhorn 15 Peoria St. Ottawa Illinois 1 #54 cabinet in mahogany with brass handles dull finish.

Advanced — 8 minutes

3. Insert marks of all kinds in the following as needed :

Come now my friend you cant deceive me. Our boys outfits are just as good as yours and with that he hung up the receiver.

We manufacture all kinds of paper writing paper dull

COMMERCIAL TESTS AND HOW TO USE THEM

and gloss finish in note letter and folio sizes book papers both machine finish and supercalendered also wrapping paper in heavy and light weights specializing on fiber stock.

DIRECTIONS FOR GIVING AND GRADING GRAMMAR AND PUNCTUATION TESTS

(Read these directions to the class, waiting after each step for pupils to do as requested. Repeat as often as necessary for clear understanding, but do not answer questions otherwise.)

Step 1. Write your name, school, class, and date at the top of the sheet. Do not begin the test till I give the word to start.

Step 2. You are allowed 15 minutes for both the Elementary and Advanced Grammar Tests. Do both without stopping.

The first paragraph of the Elementary Test is to be divided into sentences by inserting periods and capital letters where necessary. Do not make any changes in the wording.

Where two forms are given in parenthesis, draw a line through the one that is wrong, so that the sentence will read correctly with the portion that is left. (On the board, show pupils how to draw a line through a wrong word, else they will not mark the papers uniformly.)

If you know both forms in parenthesis are wrong, you may write the correct form in the margin; but otherwise do not mark anything outside the parentheses.

(For first series only.) In Paragraph 6 of the advanced test you will find three pairs of sentences, one in each pair being wrong and one right. Draw a line through each wrong sentence. Turn over the paper to finish the test. (Pause 15 minutes, allowing full measure of time.)

TWO SERIES OF TESTS

Step 3. We have 18 minutes, if necessary, for the entire punctuation test, elementary and advanced. Do both parts without stopping.

Draw a short line under each letter to be capitalized (not under the whole word) in the first paragraph. Do nothing else in that paragraph.

Insert necessary commas in the second paragraph. Do nothing else there.

Insert necessary punctuation marks of all kinds in the last paragraph. (Pause for 15 or 18 minutes, if necessary. If questions about the tests are asked, re-read the directions with any emphasis that will make them clearer, or reply, "You will have to use your best judgment. I cannot answer questions.")

Step 4. (If the period is exhausted, papers may be taken up and the corrections made at the next period. Papers may then be given out to any pupil except the owner.)

Has any person his own paper? If so, exchange with some one.

Write your name at the top of the sheet after "Checked by."

Step 5. In the blank column at the right, at the top of which you see a cross, make a small, heavy cross like the printed one for each error you find. Place this cross just opposite the mistake. Do not check in any way sentences that are right, or make any other marks on the paper. I will read the correct form. The form I do not read should be crossed out. (In reading, place special emphasis on the right word in parenthesis.)

Observe that in Paragraph 1 there are four places where sentence divisions should be made by inserting periods and capital letters. The period and capital letter both count as one error and should never be marked

COMMERCIAL TESTS AND HOW TO USE THEM

with two crosses. If both are omitted, or either is wrong, make one cross in the margin. There can be only four errors in this paragraph. If any sentence is not marked, count it an error.

KEY TO ELEMENTARY GRAMMAR TEST, FIRST SERIES

1. Once upon a time there was a little chimney-sweep (period; "His" begins with a capital letter). His name was Tom (period; "That" begins with a capital letter). That is a short name (period; "You" begins with a capital letter). You have heard it before (period; "You" begins with a capital letter). You will not have much trouble in remembering it.

2. I have *gone* to town. He has *written* a letter to his mother. He has *drunk* all the water. He *did* the job yesterday. I am going with you, *am I not?* or, *am I?* (Both forms in parenthesis are wrong.)

3. I *saw* him before I saw you. I *haven't heard* from him yet. He *has spoken* to me already. He *did* the work yesterday. He *has not spoken* to me so far.

4. It is *I*. It is *they*. It is *she*.

5. Between you and *me*. *Whom* will the paper be read by?

Step 6. Count up all the mistakes you have marked, and write the total in the blank space opposite "Total Errors." Write the number to the left-hand side of the space so the person who rechecks will have room to write his number, if his count does not agree with yours.

Step 7. Now mark the Advanced Grammar Test in the same way, placing a small, heavy cross opposite each error. If any sentence is not marked, count the omission an error.

TWO SERIES OF TESTS

KEY TO ADVANCED GRAMMAR TEST, FIRST SERIES

1. Every one of those men *has his* pickax. Each point *is* as clear as a star. The woman or the tiger *comes* out. Montgomery Ward & Co. *have* settled the strike. The Montgomery Ward Company *has* settled the strike.

2. The ship has *sunk*. The bird has *broken* its wing.

3. He has *laid* it down. When he came in he *sat* down. I saw that the book *lay* on the table. At eight o'clock I *lay* down. At eight o'clock I *sat* down.

4. The doctor said that fever *produces* thirst. It had happened before I *saw* him. From what I saw of him he appeared *to be* a man of letters.

5. I wish Anna *were* here. If Anna *were* here, she would nurse him. If Anna *was* there, she was the life of the company.

6. While sitting on my doorstep, I caught sight of a beautiful butterfly. (The second sentence is right.) By so doing you will clear up the matter. (The first sentence is right.) On weighing the sugar he found a shortage. (The second sentence is right.)

7. I saw *him* doing it. I approve *his* doing it. What do you think of *my* going to town?

8. I was frightened at the *length of that examination*. For *goodness'* sake. (The first form, with apostrophe after the *s*, as a special idiom.) He spoke of the *fertility of the land*.

9. I do not like *that* sort of people. I belong to *that* kind myself.

10. He feels *bad* about it. It looks *good* to me. The general stood *firm*.

Count up the errors in the advanced test and write the total on the left-hand side of the blank space after "Total Errors."

COMMERCIAL TESTS AND HOW TO USE THEM

Step 8. Now mark the punctuation test in the same way, by placing a small, heavy cross in the blank column at the right for each error you find. Do not make any other marks on the paper.

Particularly note this: If you find any capital letters or commas or other punctuation marks which I do not read, mark each one of them with a cross as an error. Anything that might be one way or another I will tell you about as we go along. If a line has been drawn under the whole word to be capitalized, do not count that a mistake.

KEY TO PUNCTUATION, FIRST SERIES

1. John (capital) Askam (capital), Esq. (capital) was awarded the degree of LL.D. (all three letters capitals, but if this is not marked at all count it only one mistake) at the last commencement of Dartmouth (capital) College (capital). He is a professional bacteriologist in the service of the State (capital) of Massachusetts (capital), *i.e.* he is employed by the State (capital) Board (capital) of Health (capital). In (capital) his appointments President (capital) Wilson (capital) favored the East (capital) rather than the West (capital). He (capital) wrote for the National (capital) Educator (capital).

(Be sure to check any word marked which I did not read.)

2. In the course of time (comma), when you have grown older and wiser (comma), you will find men and women who will appreciate your hard work (comma), you will get your reward (comma optional, there is no mistake whether it is inserted or not inserted), and the satisfaction of having done your best will be a compensation in itself.

(If you find any commas I have not read, be sure to mark them.)

TWO SERIES OF TESTS

In the first place (comma), if I know anything about John Higgins (comma), it is morally certain that he was not the thief. However (comma), I should not advise you to do it (comma), for I fully believe you will lose money if you do.

(Be sure to mark any commas I did not read.)

Will you kindly let us know by return mail ("by return mail" may have a comma before and after, or may not have any commas at all, but if there is a comma only before or only after, mark it as an error) just when you expect to ship our order (comma optional — right either way) No. 4568 (comma must be inserted), a No. 46 sideboard (comma optional) to be sent direct to our customer (comma optional) James Oakley (comma required), Pocahontas (comma required), Montana. Our customer wishes to get this sideboard at the earliest possible moment (comma), and we have promised to hurry it as much as possible.

(Remember to mark as an error any comma which I have not read.)

Count up all the mistakes in the elementary test and write the total at the left-hand side of the space opposite "Total Errors." If there are many errors it will help you to count up the errors in each paragraph separately. Write the number at the right-hand side of the blank column; then add these together.

Step 9. Now mark the advanced test in the same way.

3. Please send the following as soon as possible (colon): 1 doz. ladies' (apostrophe *after* the *s*) white linen handkerchiefs (comma), the best value you have at about 15¢ each (semicolon); 6 cakes of glycerine soap (comma), 15¢ a cake (comma), 6 for 50¢ (semicolon); a box of ladies' (apostrophe *after* the *s*) cream note paper and envelopes (comma), rough finish (comma), unruled

COMMERCIAL TESTS AND HOW TO USE THEM

(comma), about 25¢ (comma optional) or any special value you have of this grade.

(If a hyphen has been placed between "note" and "paper," do not count it an error.)

(Any punctuation marks I have not read should be marked as errors.)

Remember (comma), I can't (apostrophe between the *n* and the *t*) teach you how to run your business (comma or semicolon), I can't (apostrophe between the *n* and the *t*) show you how to get dollars from letters dropped in a rat-hole (semicolon required); but I do know what human nature is and perhaps you don't (apostrophe between the *n* and the *t*; followed by comma), and I do know how to line up words so as to make people send you business (comma), so far as words will do it.

(Be sure to mark as an error any punctuation mark I have not read.)

Now count up the errors in the advanced test and write the number at the left of the space after "Errors in Advanced Test." When you have done that, add the errors in the Elementary and Advanced Punctuation Tests and write the total in the space just below, opposite "Full Punctuation, add Elem. and Adv."

RECHECKING

Have pupils exchange papers again. (Let the teacher be particular to see that any paper marked by a dull pupil is marked the second time by a bright pupil.) Read directions as follows:

Step 10. Exchange papers, but be sure you do not get your own paper, nor the one you have just marked.

Write your name in the space opposite "Rechecked by."

As I read the key again, draw a circle around any cross placed opposite a sentence that is correct. If any in-

TWO SERIES OF TESTS

correct sentence has been overlooked, make a cross for it at the right-hand side of the blank column. Do not make any other marks on the paper, especially do not make a second cross for any point that has already been marked.

(Read the key just as for the first checking.)

Step 11. Now count up the errors again. If your count does not correspond with the first count, go carefully over the marks a second time to see where the difference is. When you are sure you are right, cross out the first count, which was wrong. Do not leave any figure except the right total. If test was not finished, write "not finished" below the grade, and write in the correct total.

(When all four tests have been rechecked, have the papers returned to the owners so that they can see whether they have had a fair marking or not. Ask them to look their papers over and call your attention to anything that does not seem right to them.

(The teacher should have written the names of the class on the blank tabulating sheets before or during the test, and be ready to call the roll. Count of errors should be entered in the column "1st Test" or "Opening." In the case of punctuation, enter the count of the elementary test, and then in the column headed "Full Punc." enter the total errors in both elementary and advanced tests. It is not necessary to list the errors in the advanced punctuation test separately. This does not apply at all to the grammar tests.

(Be sure that the teacher writes her name, school, and class at the top of *each* tabulating sheet; second and third sheets as well as the first.

(Read the key at a natural, moderate rate, clearly articulating, neither too fast nor too slow. Checking

COMMERCIAL TESTS AND HOW TO USE THEM

and rechecking should be completed in a 40-minute period, but if the class is slow and asks many questions, it will take longer. Tabulating and talking over the tests will require a second period.)

KEY TO ELEMENTARY GRAMMAR, SECOND SERIES

1. He is a tall boy (period; "He" begins with a capital letter). He is going into business with his father (period; "In" begins with a capital letter). In school he led his class (period; "He" begins with a capital letter). He played first base on the baseball team (period; "That" begins with a capital letter). That fact made him popular.

2. I have *sung* that song before.

Had the horse *swum* the river before?

The boy *did* as he was told.

He likes me, *doesn't* he?

3. Nobody can spell as well as *she*.

To whom should it be given, you or *me*?

Does she stand better in her class than *I*?

Does she stand in her class ahead of you and *me*?

4. Who is it? (Answer either) *I*, *he*, or *she*. To whom shall I give this? (Answer either) *me*, *him*, or *her*. Will any one lend me a knife? (Answer either) *I*, *he*, *she*. (If any one of the three is written in the test, it would be counted correct.)

5. Every one is doing *his* work. Either John or May or Henry or George *is* selected.

KEY TO ADVANCED GRAMMAR, SECOND SERIES

1. *Have you heard* from him today? *I haven't got* your answer yet. Before you had arrived, *I had got* the work attended to. Since yesterday three carloads *have arrived*. Already fifteen men *have been* put to work.

TWO SERIES OF TESTS

2. The river has *overflowed* its banks. The dress *has worn* well.

3. Let you and me go (the first two forms should be crossed out).

4. Is it John in the 7th or Helen in the 8th who stands at the head of *his* class? Every one in the office is working as if *his life* depended on it. All those in the office are working as if *their lives* depended on it.

5. We like *him whom* the people have honored. Between the pair of us, you and *me*, you would think one would have got it right. *Whom* do you imagine it to be?

6. None of the boys *is* elected captain yet. Early to bed and early to rise *seems* to be the rule of this house. The Standard Oil Company *has* issued a statement. Marshall Brown & Co. *have* issued a statement.

7. I was puzzled to know what to think of *John's* marrying her. He has made a careful study of the *progress of the building*. Ten *days'* (apostrophe after the *s*) work.

8. He tied the rope and by *this* means saved the load. If the scissors *cut*, *they* are worth the money. He has been here *these* two hours.

9. He was the *richer of the two*, or the *richest of the three*. (Count either one of those right.) Can't you make your story *more nearly complete*? Do you think my work more or less *nearly* perfect than John's? (*Nearly* must be inserted in each.)

10. The milk tastes *sour*. The man's breath smells *bad*. The car certainly rides *easy*.

KEY TO PUNCTUATION, SECOND SERIES

Elementary

1. The Oriental (capital) Steamship (capital) Company (capital), a Pacific (capital) Coast (capital) corporation

COMMERCIAL TESTS AND HOW TO USE THEM

and one of our leading Western (capital) business houses, has applied to the Interstate (capital) Commerce (capital) Commission (capital) and the California (capital) State (capital) Public (capital) Utilities (capital) Commission (capital) for a special through rate from Chicago (capital) to Honolulu (capital). James Dawson, president of the company, makes affidavit that Oriental (capital) business would greatly increase, *e.g.* on cotton goods in competition with British (capital) trade.

2. We acknowledge receipt of your remittance of \$14 (comma), which has been placed to your credit (comma), and in accordance with your request we are shipping ten gallons additional.

Unless we hear from you to the contrary (comma), we shall ship the balance the middle of May (comma), mailing you invoice the day of shipment.

Ten gallons of boiled oil and ten gallons of turpentine (comma), fifty pounds of white lead and ten pounds of zinc white (comma optional) ought just about to meet your needs.

Ship to James Schermerhorn (comma), 15 Peoria St. (comma), Ottawa (comma), Illinois (comma), 1 #54 cabinet in mahogany (comma), with brass handles (comma), dull finish.

(Commas before and after "in accordance with your request" might be justified and need not be marked wrong, but a comma only before or after should be marked wrong.)

Mark with a cross any additional commas which you find that I have not read. I will pause a moment while you look through the paragraph to see if there are any such.

Advanced

3. (Quotation marks) "Come (comma), now (comma), my friend (comma), you can't (apostrophe between the

TWO SERIES OF TESTS

n and the *t*) deceive me. Our boys' (apostrophe after the *s*) outfits are just as good as yours (comma, quotation marks, dash)," — and with that he hung up the receiver.

We manufacture all kinds of paper (dash) — writing paper (comma), dull and gloss finish (comma), in note (comma), letter (comma optional), and folio sizes (semicolon); book papers (comma), both machine finish and supercalendered (semicolon); also wrapping paper in heavy and light weights (comma), specializing on fiber stock.

Mark with a cross as errors any additional punctuation marks which you find.

(In grading the elementary test alone, deduct $3\frac{1}{2}$ per cent for every error of any kind. For "Full Punctuation Test" (elementary and advanced combined into one), add together the total errors in the Elementary and the Advanced, and deduct 2 per cent for each error in the combined total. The "Advanced" is not listed alone, but only in combination with the elementary as the "Full Test.")

(The Elementary and Advanced Grammar tests, on the other hand, are always graded separately, as two distinct tests. For every error in the Elementary Grammar test, deduct 5 per cent, and for every error in the Advanced Grammar test, deduct 3 per cent.)

DIRECTIONS FOR TEST ON ELEMENTARY PUNCTUATION

(When given by itself)

(Distribute test papers to class.

(Read these directions to the class word for word, waiting after each step for pupils to do as requested. Repeat as often as necessary for clear understanding, but do not answer questions otherwise.)

COMMERCIAL TESTS AND HOW TO USE THEM

Step 1. Write your name, school, class, and date at the top of the sheet. Do not begin the test till I give the word to start.

Step 2. You are allowed 10 minutes for inserting the necessary capital letters and commas in this test.

Draw a short line under each letter to be capitalized (not under the whole word) in the first paragraph. Do nothing else in that paragraph.

Insert necessary commas in the second paragraph. Do nothing else there. (With watch in hand, allow full 10 minutes if required for marking this test.)

Step 3. Exchange papers. Write your name at the top of the sheet after "Checked by."

Step 4. You see a blank column at the right with a X at the top of it. As I read the key to this test, make a small, heavy cross in that blank column opposite each error you find. Do not check in any way what is right, or make any other marks on the paper.

Particularly note this: If you find any capital letters underscored, or commas or other punctuation marks which I do not read, mark each one with a cross as an error; also mark as an error the omission of any of the marks I read. If a line has been drawn under the whole word to be capitalized, do not count that a mistake. (Read Key to Elementary Test as given above.)

Count up all the mistakes in the elementary test and write the total at the left-hand side of the space opposite "Total Errors." If there are many errors, it will help you to count up the errors in each paragraph separately and write the numbers at the right-hand side of the blank column; then add these together.

Step 5. Exchange papers again. Write your name after "Rechecked by" at the top of the sheet. (Teacher should see that particularly dull pupils exchange this

TWO SERIES OF TESTS

time with bright pupils. Go about the room and make this exchange arbitrarily without explanation.)

Step 6. As I read the key again, draw a circle around any cross opposite a line that is correct, but if any error has not been marked, make a cross for it. Do not make any other marks on the paper; especially do not make a second cross for any point that has already been marked. (Read the key just as for the first checking.)

Step 7. Now count up the errors again. If your count does not correspond to the first count, go carefully over the crosses again, of course omitting any that you have circled as being wrong, and when you are quite sure you are right, mark out the first total and write in the correct total as you find it. Be sure not to leave two totals so that it will be impossible to tell which is the right one.

Step 8. Return all papers to owners.

Step 9. Look over your paper and see if you find anything that seems to you unfair marking. If you find anything, do not make any change yourself but call it to my attention and I will make whatever change is required. [Now, as I call the roll, give me the number of errors as you find it at the bottom of your test paper.]

7. ELEMENTARY TEST IN LETTER WRITING

This test may be written on the board. It can be given to seventh and eighth grade classes after training, or to any higher classes.

Half an hour may be allowed for writing this letter. Elementary pupils may be allowed to compose the letter on one sheet and then copy, using 15 minutes' additional time.

Averages of beginners in business houses (grammar-school graduates), 7 errors to a 100-word letter; graduates of commercial departments of high schools, 5 errors;

COMMERCIAL TESTS AND HOW TO USE THEM

experienced stenographers, 2 errors. With school classes it is difficult to be sure of having got a complete checking of errors, unless papers are gone over by a rigid, independent critic. Faithful checking by class members will, however, give sufficiently close results for school purposes. Classes trained for five weeks or more on use of this system of self-criticism will get very reliable results.

Write the test on a blackboard if test papers cannot be supplied.

First Series

Write a letter of application for any actual position you believe you can fill acceptably, about 100 words, fully describing your (1) education, (2) experience (including amateur undertakings), and (3) ambitions. Special attention should be paid to the neatness and form of the letter, spelling, punctuation, and paragraphing, as well as to the choice of words and smoothness of expression. State (4) age, (5) sex, (6) color, (7) physical strength, and (8) appearance.

Second Series

Write a letter of about 100 words for a position you can really fill. Address the letter to a business firm you know, where you might expect to get a position. The letter should be in neat handwriting, with correct margins and arrangement, properly punctuated and grammatically correct, and expressed in natural, forceful language. State in tabular form: (1) age and sex, (2) education, (3) experience (business or amateur), (4) nationality of parents, (5) health, (6) pay wanted, and (7) ambitions for the future.

TWO SERIES OF TESTS

DIRECTIONS FOR GIVING AND GRADING TEST ON LETTER WRITING

(Distribute paper of full letter size, 8½ by 11 inches, ruled but without any vertical red line on it, and also pens and ink. A test of this kind must always be written in ink, on one side of the paper only.)

Step 1. Write at the extreme top of your sheet of paper, for reference only and not as part of the letter, your name, school, class, and date, all on one line. On the next space that might be called a line write "Checked by" at the extreme left-hand side. On the third space that might be called a line, at the extreme left, write "Rechecked by."

Step 2. Now, ignoring what you have written at the top, you are to write this letter of about 100 words (the exact count is not important), placing it properly on the sheet, giving your own home address and the present date. Address the letter to an actual business house or person you know, giving the correct address. Make your answers apply truthfully to yourself as you are now, not to an imaginary person such as you may be later. I cannot answer any questions to help you compose your letter. You must use your own best judgment, without wasting time. You will be allowed half an hour to write this letter.

(If there is not time to check the letters in the same period, they may be collected and given out at a future period for checking. If the checking is not finished in one period, the papers may be taken up a second time and later given out again to the persons who were previously at work upon them. Correction of letters by this method through the pupils is slow, but it furnishes very valuable instruction. Unless done thoroughly, it has little value.)

COMMERCIAL TESTS AND HOW TO USE THEM

Step 3. See that you do not have your own letter. Write your name in the space after "Checked by."

Step 4. First of all we will see if the eight facts called for in this letter have been covered. I will write them on the board three at a time and give you a brief explanation of what you ought to find stated in the letter you have before you.

You know what education is. Any reference to the class in school in which a person actually is will cover that.

"Experience" means anything outside of class work which might fit for this job. It might be work at home nights or Saturdays, or it might be such things in school as managing a ball team, editing a school paper, or doing any of those things that are not class work. These latter would be called "amateur undertakings." Setting up a wireless station would be an amateur undertaking.

"Ambitions" refer to anything that the person wants to do beyond the immediate thing he applies for. For example, if you want a job so that you can earn money to go to school next fall, that is an ambition. Or you may wish to go to school so as to become a teacher or anything like that in the future. You do not have an ambition to get this job.

Now look through the letter before you carefully, and wherever you find anything about "education," write in the left-hand margin a figure "1"; where you find anything about "experience," write a figure "2"; where you find anything about "ambitions," write a figure "3." The order does not matter.

Step 5. The fourth fact to cover is age; the fifth, sex (whether boy or girl); and the sixth, color.

If application has been made for a position as office boy or the like, that shows it is a boy. Merely signing a girl's

TWO SERIES OF TESTS

name or a boy's name is not sufficient. There must be something in the letter that distinctly shows that the person who wrote the letter noticed No. 5 and tried to cover it.

"Color" may be covered either by saying one is white or negro, or giving the complexion as light or dark, blond or brunette.

Where you find each of these facts covered, write the corresponding number in the left-hand margin, regardless of order.

Step 6. No. 7 is "physical strength," which refers to health, or general ability to do the job and keep at it day after day. A boy who plays football may be assumed to be strong, etc.

No. 8, "appearance," may be covered by saying one is tall or short, heavy or small, or by giving height or weight, or anything like that.

Mark the numbers for these in the same way.

Steps 4 to 6 for Second Series

Step 4. First of all we will see if the eight facts called for in this letter have been covered. I will write them on the board three at a time and give you a brief explanation of what you should look for.

The first fact is not numbered. It says, "State in tabular form," that is, in a column, as a table, one fact under the other, with or without numbers. That makes it much easier to check. Since we have seven numbers, we will call this "8." Write "8" in the margin near the top if the items are arranged in tabular form.

Now put down in the left-hand marginal space the number of each item you find covered.

Item No. 1 is age and sex, that is, whether boy or girl. If either is missing, you cannot put down a figure "1."

No. 2 is education. Anything about school work

COMMERCIAL TESTS AND HOW TO USE THEM

which shows in what grade the person is will cover this. If the amount of schooling is not shown in any way, the point is not covered.

No. 3 refers to anything that has been done outside of class work, whether as work at home, nights, or Saturdays or during vacations, or such things in school as managing a ball team, editing a paper, or the like. Setting up a wireless station would be called an "amateur undertaking."

Step 5. The next three points, (4) nationality of parents, (5) health, and (6) pay wanted, I think are clear and do not need further explanation. Write the corresponding figure in the left-hand margin wherever you find the points covered.

Step 6. The only point that remains is "ambitions," No. 7. This refers to anything that the person wants to do in the future. One is not ambitious to get this immediate job, but one may want to get it so as to earn money to come back to school next fall, and that would be "ambition." Or one may wish to become a teacher, or a professional man, an engineer, or a business man, etc.

The Following Steps Apply to Both Series

Step 7. Now let us check up two more facts. Is the address given by the writer at the top of the letter sufficiently complete so that a letter sent to the person at that address could be delivered? In a city there would have to be a street and street number, a building, or the like, but in a small town only the town and state would be required. If this address is sufficient, write in the left-hand margin a figure "9."

Step 8. A third fact that should be covered is whether the position wanted is clearly stated. Many boys and girls apply for positions without stating what the posi-

TWO SERIES OF TESTS

tions are so that business men may know what they are applying for. If the position wanted is clearly stated, make a figure "10" in the left-hand margin opposite the beginning of the letter.

Step 9. Now we will count up all the facts covered in the letter to see if there are ten in all. If this count shows that any are omitted, write below "Rechecked by" in the upper left-hand corner "Om." for "Omissions," followed by the number of points not covered. If there are no omissions, write "Om. 0."

Step 10. We will now take up the correctness of the letter one point at a time. Do not look ahead, but keep your mind fixed on the point we are talking about until all of us have finished that point. Then we will go on, all together, to the next point.

FORM OF THE LETTER. Make a small, heavy cross in the margin at either end of the line for any error in that line.

Margins. Is the left-hand margin not less in width than one joint of the finger or more than two joints — three quarters of an inch to an inch and a half, and fairly straight? Is the right-hand margin not less than a quarter of an inch, so that not more than three lines on a page come near touching the edge of the paper? (These margins are for handwritten letters on letter-size paper. Modify them for note size, or typewritten letters, which require larger margins.) Is the letter crowded too high on the sheet, or is it placed too low? Are the paragraphs indented half an inch to one inch and a quarter?

Date line. Are a street name and a street number required? Do they come first, with a comma only at the end of the item? Is *St.*, *Ave.*, or *Boul.* capitalized and followed by a period if abbreviated? Is there no period after *16th* or the like? Is *Sixteenth* capitalized if spelled out?

COMMERCIAL TESTS AND HOW TO USE THEM

Do the city and state come next, with comma between them, and with a comma after the period for the abbreviation of the state, if it is abbreviated? Make a cross for any item omitted or out of order.

Does the date come last, as *April 25, 1917*, with comma after 25 and period after 1917, but no comma after *April*?

Is the whole heading of the letter well balanced, and placed to the right-hand side of the page?

Name and address. Is the name of the person to whom the letter is written just flush with the margin? Is it followed by a comma? Is the address on the next line indented as a paragraph (exception for typewritten letters, where address may be flush with margin), followed by a comma, periods after all abbreviations, *St.*, etc., capitalized? Does the third line have a double indentation? Is there a comma after the city and a period after the state even if it is spelled out in full (no other punctuation)?

Salutation. Is the salutation flush with the margin? Followed by a colon? (never a comma or semicolon). *Sir* beginning with a capital letter? *Dear Sir* for a man, *Dear Madam* (never *Madame*) for a woman, *Gentlemen* (never *Dear Sirs*) for a firm or institution, *Ladies* for a firm of women? Does the body of the letter start as a paragraph, on a new line (not farther to right than other paragraphs, an old-fashioned style)?

Complimentary close. Does it start at least a third of the way across the page, and not more than two thirds of the way, on a separate line? Does it begin with a capital letter, and is it followed by a comma (no word capitalized except the first)? Is there any apostrophe about "Yours"? Is it formal, such as "Yours truly," "Respectfully yours," when the opening is formal, or an informal close like "Sincerely yours," used only in

TWO SERIES OF TESTS

letters of a friendly and personal nature? Does the name come on a line below, starting a little to the right of the beginning of the complimentary close? (It may or may not be followed by a period.) If a woman's name is preceded by Miss or Mrs., is the title in parenthesis?

Step 11. Wording of the letter. Let us now examine the choice of words and phrases to see if they are all natural and correct. It is an example of poor wording to say "I am of the age of 13 years" (two *of*'s), "I have had some experiences" (plural instead of the singular *experience*), "I *seen* your *add* in the paper" (a bad error of grammar like *I seen*, or *add* with double *d* instead of *ad.* as an abbreviation or short form for *advertisement*). Let pupils raise their hands and ask about any wording on which they are doubtful till all have marked the wording to their satisfaction. Write *w* in the margin for each example of poor wording.

Step 12. Spelling. Let us read the letter carefully through again to see if the spelling of any word is doubtful. If so, the pupil must be sure to ask.

Step 13. Punctuation. Let us now look the letter through especially for punctuation. Write *p* in the margin for each example of wrong punctuation.

Are any sentences run together with only a comma between?

Are there any compound sentences with *and*, *or*, or *but* which should have a comma before the conjunction? Are there any compound predicates, the subject not expressed before the second verb, where there is a comma before *and* or *or* that should not be there?

Are there any subordinate clauses which should be set off by commas?

Are there any subordinate clauses set off by commas which should not be so set off, because they are short

COMMERCIAL TESTS AND HOW TO USE THEM

and closely connected with the main clause in meaning, or are essential to the meaning?

Are there any words thrown in which should be set off by commas?

Are there any commas anywhere that are not needed?

Are there any words, phrases, or clauses in series which should be separated by commas, including a comma before the *and* or *or* connecting the last two items of the series?

Are there any addresses in the letter, of which the items of street and street number, town, and state should be separated by commas?

Are there any proper nouns or proper adjectives like *English*, *American*, or the like, which are not capitalized? Are there any common nouns capitalized that ought not to be capitalized?

Let pupils look carefully for each one of these items of punctuation, one item at a time, and ask if in doubt.

Step 14. Record. Write at the top the number of errors under each head, — Facts Omitted, Form of the Letter, Wording, Spelling, Punctuation, and then add all together for Total Errors. When tabulating for a class make a list in two columns, — Facts Omitted and Total Errors (which includes Facts Omitted).

8. TEST ON ANSWERING LETTERS (ADVANCED)

For this test printed catalogue pages are required. The same catalogue pages are required for both tests.

The catalogue pages may be handed out the day before the test is given, so that those to be tested may familiarize themselves with them. Time allowed for the test itself, 30 minutes.

This test should be handled easily by any one familiar with business practice, even if not a trained correspondent.

Nine facts need to be stated in the three letters. Busi-

TWO SERIES OF TESTS

ness employees tested covered on the average 5 of these and were rated "Fair — $3\frac{1}{2}$ " (on scale of 5). The tact with which the facts are presented to the customer has to be judged personally, and was considered by the author in the case of the business employees tested to be "Fair — $3\frac{1}{2}$ " (on a scale of 5). The form and correctness of language, spelling, grammar, punctuation, wording, etc., may be marked under the system outlined for the elementary test. For advanced students and business employees a standard near perfection and a different basis of grading may be employed. Not more than one minor error in each letter would give a score of "Excellent — 5." One or two serious errors such as common words misspelled, or five or six minor errors that would not prevent the letter from passing a business house, would give a score of "Good — 4," the actual average of the business employees of all kinds who were tested. The five highest employees tested averaged "Excellent — 5" on all three classes of points. Letters written by high-school students were good only in form, no measurable record being made on stating facts or presenting them with tact and judgment.

First Series

Answer the following letters, referring freely to the catalogue pages supplied, in which all necessary facts will be found stated. Use judgment in making additional suggestions, and present the facts in a tactful, human style, such as a business man would expect. Use current date, and address of New York store found in catalogue. Parcel-post charge to 8th zone is 12¢ a pound, 4th zone, 15¢ for 3 pounds.

1. Under No. FF10P you describe white-metal safety pins. I do not exactly understand what you mean. Is

COMMERCIAL TESTS AND HOW TO USE THEM

it 2 for 10¢, 3 for 12¢, or what? This seems a very high price. I want common safety pins.

Will you let me know how many different sizes of safety pins there are in FF15P, and are they all mixed together?

Hilda Maxwell, Waterbury, Conn.

2. I should like to order one of your khaki cloth skirts, price \$2, weight 36 oz. Would you send it free delivery? If not, what would I have to add to cover the parcel post on it?

Helen Zimmerman, Lima, Ohio,
4th zone from New York.

3. I wish to make up an order of notions from page 3 of your catalogue, but as the weights of a good many things are not given, I do not know whether I can make up such an order so as to get free delivery. My order would include FF 2, 4, 8, 13, 17, 18, 22, and 23 P. Would you send these free delivery?

Marion K. Drake, Ogden, Utah,
8th zone from New York.

Second Series

Referring to four pages of Wanamaker's catalogue furnished in a separate folder, dig out the necessary business facts (nine) and reply to the letters, (1) covering the facts clearly, (2) explaining with tact and patience, and (3) with correct form and expression. 30 minutes.

1. I have a girl of 10 and a boy of 14 for whom I should like to get gloves, something in good leather that will wear well. Could you recommend 131W8, what sizes would be required, and would you send free delivery?

(Mrs.) J. D. Evans, Frankford, Pike Co., Mo.

TWO SERIES OF TESTS

2. Your catalogue speaks of 131W6 and 131W7 white kid gloves as being 16-button length and 12-button length. Don't they actually have 16 and 12 buttons? And how can I judge as to about the difference in length of these gloves? Are 131W1 the same gloves in black?

Helen Baker, Ilion, N. Y.

3. Would you send white kid belt TT13W free delivery? I see it weighs only 4 oz. packed. Or if I ordered two belts would you send them free delivery?

Janice Meredith, Reno, Nev.

DIRECTIONS FOR CORRECTING AND GRADING TEST ON ANSWERING LETTERS

The outline for the elementary test on page 135 may be followed, but this test requires the exercise of intelligence under free conditions.

The following nine facts may be checked up as the eight facts were in the elementary test, a figure being placed in the left-hand margin for each fact covered, regardless of order.

Facts, First Series

Letter 1.

1. Numbers indicate sizes.
2. Picture shows card with a dozen pins on it.
3. Picture shows FF15P safety pins assorted in compartments of a box.

Letter 2.

4. Limit of weight for \$2 value to 4th zone is 32 ounces and skirt cannot be sent free.
5. Amount of parcel postage should be stated in letter, or if not known, it should be indicated by a blank to be filled after looking up — 15¢.

COMMERCIAL TESTS AND HOW TO USE THEM

6. Suggestion should be made that the order be increased to \$3 without excessive weight, so that free delivery can be secured.

Letter 3.

7. The items given cannot be sent free delivery.

8. The parcel postage charges on them will be 48¢ to 8th zone, weight about four pounds.

9. Call attention to Note 5, which states that when weights are not given they are assumed to be under 4 ounces.

The facts found to be omitted when the count up is made may be recorded in the upper left-hand corner of the first letter sheet as so many "Facts Omitted." If it is desired to give a uniform scoring in addition to a simple count of the number, we may call omission of no more than one of the nine facts, "Excellent — 5," omission of no more than 2, "Good — 4½," omission of no more than three, "Good — 4," omission of no more than four, "Fair — 3½," omission of no more than five, "Fair — 3," omission of six, "Poor — 2," omission of seven, "Failure — 1."

Model Letters for Comparison, First Series

Answer to Letter 1. (To be given proper form as in model, Letter 3.)

The white metal safety pins numbered FF10 are a specialty of ours to meet the needs of those who want a safety pin that positively will not rust. The prices are for a card of 12 (see picture), and the numbers in light-faced type indicate the sizes of the pins. These pins are extra strong and have a guarded coil. You will find it difficult to get such pins elsewhere at any price.

For a cheap pin we commend to your attention FF15P,

TWO SERIES OF TESTS

a box with 144 pins of assorted sizes in compartments (see picture) at 50¢.

Answer to Letter 2.

You inquire if we could send a \$2 khaki cloth skirt, weighing 36 ounces, to Lima, free delivery.

As Lima is in the 4th zone, the limit of weight for free delivery on a \$2 value is two pounds, or 32 ounces, just a little less than the weight of the skirt.

Couldn't you include an order for something else weighing not over 12 ounces and valued at \$1 or over? Then you would be entitled to free delivery on a \$3 order weighing 3 pounds. Or just add 15¢ postage on the skirt alone.

Answer to Letter 3.

John Wanamaker

*Broadway, 4th Ave, 9th and 10th Sts
New York*

*Philadelphia
City Hall Square
Paris
20 Rue des Petits Champs*

October 11, 1919.

Marion K. Drake,
Ogden, Utah.

Dear Madam:

When the weight of an article is not given in our catalogue, as stated in Note 5 on the back inside cover page, the weight is less than four ounces. The total weight of the items you mention would approximate 60 oz., or just under four pounds. As Ogden is in the eighth zone, the rate would be 12¢ a pound, or 48¢ in all. The total amount of the order not being sufficient to entitle you to free delivery at such a distance, you should just add the 48¢ postage to the amount of the order, and on receipt we will send the articles very promptly.

We sincerely hope we may have the pleasure of serving you.

Very truly yours,

JOHN WANAMAKER.

[147]

COMMERCIAL TESTS AND HOW TO USE THEM

Judgment as to the success with which the facts have been explained to the customer, the salesmanship or human presentation element, will have to be formed largely by comparison with the preceding model or key letters. Several letters may be read in the class and their merits discussed. Then the corresponding key letter may be read, and the comparison further discussed. A mechanical rating on this point is impossible, and we must depend on the best individual judgment expressed as "Excellent — 5" (scale of 5), "Good — $4\frac{1}{2}$ " and "Good — 4," "Fair — $3\frac{1}{2}$ " and "Fair — 3," "Poor — $2\frac{1}{2}$ " and "Poor — 2," and "Failure — 1."

The form of the letter may be checked up on the detailed outline supplied for the elementary test, but a distinction should be made between slips of the pen or typewriter which would be passed over by a business house, and errors of such a serious character that they would require rewriting before the letter could be sent out. One minor, trifling error in each letter would not stand in the way of a rating of "Excellent — 5"; two minor, trifling errors in each letter would not prevent a rating of "Good — $4\frac{1}{2}$ "; four or five minor errors in all, and one serious error that would require correction, would justify "Good — 4"; any error that would require entirely rewriting a letter, one or two common words misspelled, one word or phrase incorrectly used, or general lack of balance in margins, indentions, paragraphing, etc., five or six errors of punctuation, or one or two of these errors united, would justify only "Fair — 3"; and if not one of the letters could be sent out by a first-class business house without some important corrections, form would be rated "Poor — 2"; or if all three letters required complete rewriting, "Failure — 1." Observe that the count of errors above is to be

TWO SERIES OF TESTS

applied to the three letters taken together, not to each letter separately.

A thoroughly satisfactory rating on this test could be given only by an experienced correspondent, whose name should be attached to his ratings. Any style or form commonly used in business should always be recognized, regardless of the preference of the grader, whose attitude should be as nearly as possible impersonal. There will be distinct value in rating these letters under the three heads separately instead of on one score in which all three considerations would have to be mixed without distinction or valuation of each element.

Observe that these letters are supposed to be written by persons not immediately familiar with this business, and errors might be expected and tolerated which would not be made by a correspondent who had been connected with that business for two or three weeks and was familiar with the system. At the same time all these points were covered on tests perfectly by skilled correspondents engaged in entirely different lines of business, though the test was severe enough so that very few of the correspondents got all points right, some overlooking one point, and others another point. No point seemed to be so obscure as to puzzle an undue number.

Facts, Second Series

First Letter :

1. Gloves 131W8 are silk and not suited to the boy.
2. Call attention to 131W9 as leather gloves.
3. The girl would require size 5 or size 6 ; boy might wear size 7 if his hand were small, or take smallest size of men's gloves.

COMMERCIAL TESTS AND HOW TO USE THEM

4. Add 4¢ for postage in case of 50¢ gloves, \$1 gloves go free.

Second Letter :

5. Picture shows 3 actual buttons, length same as old style of gloves that had 12 and 16 buttons.

6. Judge length of gloves by comparing hand portion with arm in picture; or 12-button comes below elbow, 16-button above elbow.

7. Catalogue says gloves 131W1 are silk, not kid; but you may or may not assume that black kid could be furnished at same price though not listed.

Third Letter :

8. As belt TT13W is only 50¢ it could not be sent free delivery, as on second page of catalogue it is stated that no free delivery will be made on goods costing less than \$1.

9. Two belts would amount to \$1, but would weigh 8 oz. and come under the pound rates. The table shows \$3 is required in the 8th zone. Add 4¢ postage on each belt, 8¢ for two.

Model Letters for Comparison, Second Series

1. We have received your inquiry concerning gloves for a girl of 10 and a boy of 14. The gloves 131W8 would be suitable for the little girl, who would require size 5 or size 6 according as you judge her hands larger or smaller than the average child of that age. In the note you see size 4 suits age 8 and size 7 age 13, so you would select one of the sizes between these. You speak, however, as

TWO SERIES OF TESTS

if you thought these gloves were leather. You will see by reading the description carefully that they are silk. If you wish leather gloves we would recommend 131W9 or 10, price \$1 a pair. We do not list any leather gloves for less than \$1.

While 131W9 would be suitable for the boy if you thought he could wear the largest size we carry, you might have to take the smallest size of men's gloves such as 131W11. When weights are not given they may be assumed to be less than 4 ounces, as stated in Note 5 on the second page of the catalogue. As we do not send any goods free delivery priced less than \$1, you should add 4¢ for postage if you order a pair of 131W8; but any of the other numbers would be sent postpaid.

2. In reply to your inquiry concerning 131W6 and 7 white kid gloves, we beg to call your attention to the pictures just at the left. The gloves actually have three buttons, but are as long as the old gloves that had 16 and 12 buttons. You can judge the length by comparing the upper portion with the hands in the pictures. The shorter gloves are intended to come just below the elbow, and the longer gloves just above. Gloves 131W1 are silk gloves, not kid. We do not list long black kid gloves, but can furnish them at the same price as the white.

3. We have received your letter asking if we would send belt TT13W free delivery. As the price of this is only 50¢ you would have to add 4¢ for postage, as we do not send any goods free delivery valued at less than \$1. Two belts would amount to \$1, but as the weight would be 8 ounces, free delivery would be figured on the basis of one pound, which in the 8th zone calls for \$3 value, as you may see by the table on the second page of the catalogue.

COMMERCIAL TESTS AND HOW TO USE THEM

We shall be very glad to serve you promptly if you favor us with an order.

9. STENOGRAPHIC TESTS

The following letters may be used both for tests on transcribing shorthand notes, and for copying on the typewriter. Copies accurately transcribed may be used for copying tests by other classes.

These letters represent standard letter-writing material.

For test on transcribing, dictate either letter, not including name and address, in 3 minutes (100 words a minute) and ask pupils to transcribe as much as possible in 5 minutes.

Instead of counting actual words, we count "stroke-words" of four letters and one space, or five strokes to a word, including punctuation and everything except paragraph indentions and broken ends of paragraphs.

Averages for working stenographers are, — Experienced stenographers, 40 words a minute, $2\frac{1}{2}$ errors to each 100 words; high-school graduates, 30 words a minute, 5 errors to each 100 words.

Copying records should be 5 words a minute higher.

If persons tested can transcribe or copy this letter in less than five minutes, they should continue by recopying from the beginning.

Date, address lines, and salutation are not timed or counted, but are used as preparatory practice, to see that the typewriter is in good order, but the complimentary close and signature are to be written in the time measurement.

TWO SERIES OF TESTS

STANDARD BUSINESS LETTER, FIRST SERIES

Kansas City, Mo., Jan. 3, 1919.

Mr. Martin Fisher,
Shogun, Kans.

Dear Sir:

We suspect from your letter of January 10 that you do not have our regular winter catalogue, and take pleasure in sending you a copy under separate cover. Probably the catalogue to which you refer is our special catalogue of Winchester rifles in which no shot-guns are described. If you will look on pages 95-96 of the catalogue we are sending you, you will find a number of shotguns described and quoted. Some are priced very low indeed, yet we fully guarantee everything we sell, and you may be sure that you will find nothing better of its kind on the market.

We do not handle furs not made up into garments. For the skins we would refer you to Back, Becker & Co., 107 West Michigan St., Chicago. If you ask them for "scraps," and tell them exactly what use your wife wishes to make of them, possibly you can get small pieces at a low price which will serve as well as expensive whole skins.

We hope you will look our catalogue through carefully at your leisure, for we know you will find many splendid bargains. We carry only new and high-class stock, and permit our customers to return, at our expense, any article they do not find exactly as represented. If at any time you get any goods that do not please you, you can return them and we will refund your money, less freight or express charges. We are always pleased to answer questions, and will do everything in our power to aid you.

Trusting we may have the pleasure of hearing from you again very shortly, we remain

Yours truly,

KANSAS CITY SUPPLY HOUSE.

COMMERCIAL TESTS AND HOW TO USE THEM

STANDARD BUSINESS LETTER, SECOND SERIES

17 East 12th St., Chicago, Ill.,

Dec. 30, 1919.

James Anderson,

Baker, Ill.

Dear Sir :

We thank you for your order and shall hope to please you in every way in filling it. You will remember, however, that it is stated in our catalogue that at least half the price of a made-to-order garment must be paid in advance. We ask this not only of you but of every one, for you can readily understand that this is the only protection we have. While ready-made garments may always be returned and money will be refunded, we cannot take back made-to-order garments or exchange them.

We guarantee, however, that we will give you a perfect fit, and that you will find the workmanship and style unexceptionable in every way. If the dress is not made precisely as you order it, your money will be refunded promptly. You will see, therefore, that you, too, are fully protected.

The special fur cape to match the fur on the dress we are unable to supply ; but you can get it from Montrose J. Hanny, 563 West Eleventh St., New York City, as he supplies us with the fur we use for the trimming, and also makes garments.

We suggest that you send us the entire price of the dress in advance to save trouble for both of us. If you wish, however, you may send half, and the other half will be collected when the goods are delivered.

As soon as we hear from you we will begin work at once, and if you are in Chicago you can call and have the dress

TWO SERIES OF TESTS

fitted in our workrooms. We certainly hope we may please you.

Yours truly,

JONES & CO.

DIRECTIONS FOR GIVING AND GRADING THE TRANSCRIPTION TEST

A little preparatory practice in reading this letter aloud will enable the dictator to adopt a rate of speed that will cover the letter very closely in three minutes, or at any rate which it may be desired to adopt for purposes of testing speed in shorthand.

In dictating, read in such a way as to indicate the punctuation marks, but do not dictate them. Each paragraph, however, should be indicated by saying "Paragraph." The names need not be spelled out if they are enunciated very clearly and slowly.

The following directions for transcribing or copying may be read to the class without further explanations:

Step 1. Take your places at the machines and put in a plain sheet of typewriter paper $8\frac{1}{4}$ inches wide and 13 inches long. (This length will permit the entire letter to be put on the page double-spaced without change of paper, whereas the 11-inch paper may require change if the entire letter is written.)

Set the typewriter for double-spaced lines, and place the stops at full width, 1 and 70.

At the extreme top of the sheet write your name, school, class, and date. On the next line (single-space) at the left write "Checked by." In the middle of the same line write "Rechecked by."

Now write the current date, and the name, address, and salutation, without timing, by way of getting your fingers to working. When you have finished that, set the

COMMERCIAL TESTS AND HOW TO USE THEM

machine at the usual paragraph indention of about 8 spaces and wait, ready to begin on the speed test when I say "Start."

Step 2. Are you now ready to start? You are expected to put in the paragraphs as dictated, and all required punctuation marks, but in cases where usage varies on punctuation you will be given the benefit of the doubt.

Should you finish before I give the word to stop, just start writing over again the first line of the body of the letter, and continue through the letter a second time.

As every error takes 5 off your net speed (International rules now deduct 10 for each error), you will attain your greatest speed by making no mistakes at all, rather than by hurrying.

Start. (A watch with a second hand must be held in the hand, and the timing must be accurate to the second. A clock will not serve for the test. At the end of five minutes exactly, say in a loud, distinct voice, "All stop.")

CHECKING THE PAPERS

Step 3. (It is desirable that printed test papers be distributed to the class, so that pupils can see the correct form as well as receive it through the ear.) Exchange papers, and take your places at desks where you can write with a pencil or pen and ink. Write your name in the space after "Checked by."

Step 4. As I read, place a small, heavy cross directly below every letter, punctuation mark, or space that is wrong. If words are x-ed out, place a cross below each word. If a word or paragraph is omitted, make a caret where it should go and write in the word or paragraph sign. If a word is misspelled or the wrong word is written, place a heavy circle around it. If you find other punctuation

TWO SERIES OF TESTS

marks than those which I read, call my attention to them by raising your hand, and I will tell you whether to mark them as errors or not. (Omission of all but absolutely indispensable commas may be permitted, and so may the insertion of commas in what is commonly called "close punctuation," provided commas inserted do not interfere with the meaning. Any wrong punctuation of sentence endings, or commas that interfere with the meaning, should be marked as errors.

(Read slowly, spell out every word that might be misspelled, and read every capital letter, period, comma, etc., as you come to it.)

Step 5. Exchange papers again. Write your name in the space after "Rechecked by."

Step 6. As I read again the letter which was dictated, see that a small, heavy cross is placed just below every letter, every punctuation mark, and every space that is wrong; that any omitted word or paragraph indention is written in with a caret to show the place; that every misspelled word or word incorrectly written is circled. Do not mark a second time anything already marked, and make no mark for anything that is right; but if anything is marked which you think is right, cross out the marking by drawing two or three lines through it. In any case of doubt, raise your hand and ask me.

Step 7. (If test papers have been distributed, pupils can instantly see the number of the word with which the stenographer ended. Otherwise determine the slowest and fastest records, and write on the board the part of the letter between the ending of the slowest and the ending of the fastest.)

Now we will record the speed. Let us first see what the fastest record is. Has any one finished the letter? The second paragraph? (By trial inquiry like this locate

COMMERCIAL TESTS AND HOW TO USE THEM

the ending of the fastest record.) Now let us see what the slowest record is. Has any one failed to finish the first paragraph? The second sentence? (Determine the end of the slowest record.)

You see (on the test papers or on the board where part of the test letter has been written) periods which mark the ends of all stroke-words. Every fifth word is numbered — the period immediately preceding is the end of that word. If the last word has three strokes or more written, count it a full word; if only two strokes, disregard them. Spaces between words and punctuation marks count the same as letters. When you have determined the number of words that have been written, write in the upper right-hand corner "Speed, so many words." The speed per minute we may then calculate by dividing the total number by five, but be sure first to write down the total number of words written in the five minutes. After that, write "Speed per min., so many words."

Step 8. Now we will count up the "vital errors" indicated by carets for omissions of words or paragraphs, or by circles around wrong words. Count carefully twice over and write the number in the upper right-hand corner of the sheet below the speed, after the words "Vital Errors." Then count up all the crosses indicating minor errors, twice over, and write the number after the words "Minor Errors" just below "Vital Errors."

Step 9. Add together the Vital Errors and the Minor Errors, and write the sum after the words "Total Errors."

Step 10. Deduct the total errors from the "Speed per min." to get the "Net Speed." Write the words "Net Speed" and the number of words after deduction.¹

¹ This is equivalent to multiplying the errors by five (if 5 is deducted for each error) and deducting the result from the total words written in five minutes, and then dividing that remainder by five to get the

TWO SERIES OF TESTS

Step 11. We wish now to get the number of errors per hundred words. We will take the total number of words written and regard it as so many hundreds and the nearest convenient fraction, — a speed of 240 words would be regarded as $2\frac{2}{3}$ hundreds; 242 would be the same; but 245 we might better regard as $2\frac{1}{2}$ hundreds. Divide the total errors by this, taking the nearest whole number, with no fractions, and write down the result as "Errors per 100 words."

Step 12. Now carefully check over all these calculations, asking questions in case of doubt, to be sure you are right.

Step 13. Return papers to owners. Look over your papers to see if any mistakes have been made in the marking, but do not make any alterations yourself. I will make any changes or corrections that may be required. Also count up your vital and minor errors, and recalculate your net speed, speed per minute, and errors per 100 words.

Step 14. As I call the roll, give me the total speed, total vital errors, total minor errors, net speed per minute, and total errors per 100 words, mentioning what each is before you state the number.

(Words actually used in letter writing are shorter on the average than words in sermons, speeches, documents, etc. Letter-writing words will average not far from four strokes to the word and a space, or five strokes for word and space together. Document words will run nearly five strokes and a space, or six strokes in all. It is much more convenient to mark off typewriting into five-stroke words by using the typewriter scale and placing a period

"Net Speed per Min." If 10 is to be deducted for each error, in the step as given above, the total errors should be multiplied by 2 and the result deducted from the "Net Speed per Min."

COMMERCIAL TESTS AND HOW TO USE THEM

after every five spaces. If the number of every fifth word is written in, the numbers of other words may easily be reckoned. At the ends of lines odd strokes are carried over and counted as the beginning of the first word on the next line, but care must be maintained to count a space for the end of each word, but not after a hyphen. The period and two spaces are counted at the end of each sentence. Paragraph indentions are not counted, beyond the two spaces for a new sentence. On this system a fair test may easily be prepared by the teacher.

(If words are to be figured in much material, a rule may be placed down the page at 60, 65, or 70, and the odd space of the breakover only counted, and added to the 12, 13, or 14 words in main portion.)

TEST ON TYPEWRITER COPYING

For this test a printed test paper or a regular double-spaced typewritten letter should be used. Machine stops should be set at 1 and 70. When all the machines are set at paragraph indention for the beginning of the body of the letter, and the teacher is prepared to time the test with a watch which has a second hand, the word to start may be given. Use paper 8 or 8½ by 13 inches, all letters to be double spaced.

Step 1. Write your name, school, class, and date at the extreme top of the sheet (for reference, without regard to the letter). At the left-hand side of the second line write "Checked by," and in the middle "Rechecked by."

Step 2. Copy from your test sheet as preliminary practice the date line, name and address, and salutation of the letter, and set your machine with paragraph indention for the beginning of the body of the letter. When I give the word, start. (At the end of five minutes say "Stop.")

TWO SERIES OF TESTS

Step 3. Pin or otherwise fasten your test sheet to the back of the sheet you have written and exchange papers. Then write your name in the space after "Checked by."

Step 4. We will start with the beginning of the body of the letter, ignoring any errors in the lines above. Under every letter that is wrong (or whole word if the entire word is wrong) and every wrong space or punctuation mark, or any letters that have been erased and written over, or each word if any words have been *x*-ed out, place a small, heavy cross to show an error. First I will read the letter through, including the punctuation marks, capitals, and paragraphs, and do you follow the paper before you without looking on the test copy. Then I will let you go over the paper a second time, silently comparing the printed copy with the written copy.

Step 5. Exchange papers again, being sure that the printed test is attached at the back of the written test. Write your name after "Rechecked by."

Step 6. As I read again, giving punctuation marks, capital letters, and paragraphs, see that a small, heavy cross has been placed below each word or letter that is wrong, each misstruck letter, each erased letter, each irregular paragraph indention, but do not make a second cross. Place a circle around each cross that is wrong. After following my reading carefully, then silently go over the paper again and compare it word by word with the printed test paper.

Step 7. Now to get the speed, notice the last word that is written on the paper before you, and compare it with the printed test paper, where you will find the ends of the stroke-words marked by periods, and the number of every fifth word is given. If you have two strokes beyond the end of a word, disregard them. If you have three strokes, including punctuation or the space at the

COMMERCIAL TESTS AND HOW TO USE THEM

end of a word, count the odd strokes as a word. Write the total number of words in the upper right-hand corner after the word "Speed." Make a dash and after the dash write the result of dividing the total number of words by five, to get the speed per minute. (Teachers will tell pupils whether to make record on the test blank or on the typewritten copy.)

Step 8. Now count up the total number of crosses indicating errors (omitting, of course, crosses that are circled as wrong), and write the number after the word "Errors" in the upper right-hand corner. If these errors are deducted from the "Speed per min." given above, a dash may be made and the result of the subtraction written as Net Speed.¹ Regarding the total number of words written as so many hundreds and the nearest convenient fraction, as 225 or 228 as $2\frac{1}{4}$ hundreds, or 230 or 233 or 235 as $2\frac{1}{2}$ hundreds, divide the total number of errors by this to get the "Errors per 100 words," which may be written after the total errors, following a dash. Count fractions of one half or over as a whole word, and disregard smaller fractions. (Observe that in this test there is no distinction between "vital" and "minor" errors.)

Step 9. Now carefully go over all your calculations to be sure you have made no mistake, and ask me in any case of doubt.

Step 10. Return papers to owners, who will be given a few minutes to verify total speed, speed per minute, total errors, and net speed. Now as I call the roll, give me (for class use total speed and total errors may be the best record; for public report, net speed per minute and errors per 100 words).

¹ See note on page 160 for remarks on figuring net speed.

TWO SERIES OF TESTS

10. TEST ON COPYING FOR THE MIMEOGRAPH.

This test must be copied from accurate typewritten or printed sheets.

The test is 25 standard lines, double-spaced, constituting one standard typewritten page. Every variation of space, indention, or misstriking of letters is counted an error.

Time allowed, 10 to 15 minutes (the test is solely of accuracy in normal time).

Average for high-school graduates is $4\frac{1}{2}$ errors to the sheet.

COMMERCIAL TESTS AND HOW TO USE THEM

First Series

TEST ON TYPEWRITER COPYING FOR MIMEOGRAPH

Copy the following as for mimeographing, exactly as it stands, line for line :

CLAIM FOR LOSS OR DAMAGES

1. State exactly--

Place of shipment_____

Date of shipment_____

Date shipment was received_____

2. Describe character of goods and method of packing.

3. Describe condition in which goods were received.

4. Let the person making claim fill in the following:

Name of person making claim_____

Name of shipper_____

Name of consignor_____

Amount of claim_____

To whom is claim payable_____

5. Let express agent fill in the following:

Waybill_____ Shipping station_____ Date_____ Transfer_____

I CERTIFY THAT the foregoing statements
are true, and that the attached invoice
is the original received by me or an ex-
act duplicate of the original.

Person making claim

Date of this Statement_____

TWO SERIES OF TESTS

Second Series

TEST ON MIMEOGRAPH COPYING

Copy the following exactly, line for line, same spacing;

Sales Report

States covered_____

a. Number of men in each state_____

b. City headquarters at_____

Average business per salesman

Total business for month_____

a. On #1 Grade_____

b. On #2 Grade_____

c. On Miscellaneous_____

Expenses for the month_____

a. Traveling_____

b. Hotel_____

c. Circularizing_____

d. Office_____

Analysis of net business:

Date_____ (Signed)_____

Report OK'd by_____ District_____

Date of OK_____ Address_____

COMMERCIAL TESTS AND HOW TO USE THEM

DIRECTIONS FOR GIVING AND GRADING MIMEOGRAPH TEST

Step 1. Set your machine for double spacing, full width, stops at 1 and 70. Place in the machine a plain sheet of paper either 8½ by 11 inches or 8½ by 13 inches.

Step 2. Write your name, school, class, and date at the extreme top on one line. On the second single-spaced line write at the extreme left "Checked by" and in the middle "Rechecked by."

Step 3. You will be allowed 15 minutes (if you require it) for copying this page. The lines must be reproduced exactly, line for line, the indentions being the exact number of spaces shown in the copy; but if the indention is over 5 spaces, a variation of one space will not be counted against you. The ruled lines may be written entirely across the page without counting the spaces, but the indention from the right-hand side must be nearly as shown. All errors of any kind will be counted against you. Now start.

Step 4. Exchange papers. Write your name in the blank space after "Checked by." Take seats where pen or pencil writing can be done conveniently.

Step 5. As I read I will give you the number of spaces in each indention. Make a cross below each space that is wrong (not one cross for each typewriter space, but one cross for each entire space in the copy), each letter that is misstruck, each ruled line of unequal length at the right. Call my attention to any irregular variation you do not know how to mark. If a word is wrong, count one error for the whole word, and the same for a word omitted.

Step 6. Now count up the number of crosses you find indicating errors, and write the number in the upper right-hand corner of the sheet.

Step 7. (Follow the same process for rechecking.)

TWO SERIES OF TESTS

11. TEST ON ADDRESSING ENVELOPES WITH A PEN AND ON FILING

This is intended as a test on penmanship and envelope addressing. Printed or typewritten copy of the addresses is required for each person taking the test. The filing test consists in arranging the slips when addressed alphabetically according to state, town, and name.

Addresses should be written on slips of paper about 5 by 3 inches, arranged as on an envelope. End punctuation may be omitted.

The standard rate for addresses of this character (mixed three and four line addresses, counting the state as a line) in addressing houses is 1000 in 8 hours, or about 21 in 10 minutes. Endurance must be developed by practice to maintain the pace all day; but some indication of endurance may be secured by repeating the 10-minute test three times in succession, making a half-hour test, copying all the addresses given, and then going back and copying them again.

High-school average, — 20 addresses in 10 minutes, or 60 single letters per minute, $2\frac{1}{2}$ errors in all; average of five highest out of 50, 21 in 10 minutes, no errors.

First Series

Copy as many of the following addresses as you can in 10 minutes. Remember, however, that accuracy is much more important than speed. Arrange the addresses in the form they should appear on an envelope.

- | | |
|--|--|
| 1. Ursula Dralle,
6620 Lafayette Pl.,
Petaluma, Cal. | 3. Andrew Franken,
2087 Winthrop Ct.,
Navarre, Minn. |
| 2. Wm. A. Douglass,
Holmes, Wash. | 4. Janet Whigham,
Paterson, Wash. |

COMMERCIAL TESTS AND HOW TO USE THEM

- | | |
|--|--|
| 5. Dennis Convis,
Lagos, Cal. | 16. George R. Braun,
Cambria, N. Y. |
| 6. Herman Kelso,
Paschall, Pa. | 17. Nicholas Marten,
Pekin, Ia. |
| 7. F. R. Bartholemew,
1732 Lexington St.,
Culver, Colo. | 18. Mrs. Frances Palmer,
Kingston, La. |
| 8. Samuel L. Trash,
3744 Rokeby Ave.,
Chollas, Cal. | 19. Matthew Eastman,
296 S. Abbot Ct.,
Waynesburg, Pa. |
| 9. Douglas Steinbach,
Lamoka, Tex. | 20. Francis Sheridan,
Springdale, N. J. |
| 10. Lorenz Breuer,
Amsterdam, N. Y. | 21. Clyde Rhoades,
Furneaux, Tex. |
| 11. Harriet Dewey,
434 Kammerling Ave.,
Kansas City, Mo. | 22. Victor Frisbie,
Emery, Cal. |
| 12. Lucille Harwood,
7059 E. Kalow Ave.,
Raine, Tenn. | 23. Jeanne Vance,
507 E. Erie St.,
Los Angeles, Cal. |
| 13. Alfred Everett,
Batavia, N. Y. | 24. Hermann Kehoe,
Sargent, Colo. |
| 14. Louise Abbott,
Susquehanna, Pa. | 25. Chas. H. Schmitt,
74 Cortland St.,
Fairfield, Ill. |
| 15. Andrew Harte,
849 E. Prairie Ave.,
Louisville, Ky. | |

TWO SERIES OF TESTS

FILING

Complete 20 cards (making crosses for names) and then arrange the cards alphabetically according to state, town, and name. Time allowed, 2 minutes. Then write the numbers of the cards as so arranged in order and rearrange cards as originally numbered.

Second Series

- | | |
|---|---|
| 1. Rasmus Bakke,
218 W. Oak St.,
Waverly, Wash. | 11. Harriett Downey,
876 Armitage Ave.,
Wheeling, W. Va. |
| 2. Henry A. Bannermann,
Purcell, Nebr. | 12. James McLane,
4326 Beacon St.,
Anderson, Ind. |
| 3. Josephine Beebee,
9746 Broadway,
Sharpe, Iowa | 13. Alfred Andersen,
Hathorne, Mass. |
| 4. Geo. N. Beecher, M.D.,
Abilene, Kans. | 14. Alice McLoughlin,
Roslindale, Va. |
| 5. Peter Casazza,
Pollard, Ill. | 15. Clara Butt Smithe,
205 N. Long Ave.,
Raleigh, N. C. |
| 6. Ellen L. Colley,
821 Wilson Ave.,
Marion, Ohio | 16. Mamie Rowan,
Glen Allen, N. H. |
| 7. Margaret Howards,
Cadiz, Ky. | 17. Harry E. Grover,
2105 Jackson Boul.,
New Orleans, La. |
| 8. Samuel L. Glenney,
3335 W. 38th Pl.,
Auburn, N. Y. | 18. Chas. Gruel,
Cambridge, Mass. |
| 9. Bannerman Kelpsch,
Turck, Colo. | 19. Anthony Martendale,
Orange, N. J. |
| 10. Magnus Leith,
So. Norwalk, Pa. | 20. Anna Martini,
Hatfield, Tenn. |

COMMERCIAL TESTS AND HOW TO USE THEM

- | | |
|--|--|
| 21. Chas. G. Hutchinson,
6106 Prairie Ave.,
Mobile, Ala. | 23. Adam J. Johnson,
Furneaux, Tex. |
| 22. John S. Hunter,
Long Meadow, Ariz. | 24. Francis E. O'Donnell,
Hingham, Tex. |
| | 25. Jerome A. Odell,
Ocean Bluffs, Del. |

DIRECTIONS FOR GIVING AND GRADING ADDRESSING AND FILING TEST

(Distribute to each person to be tested the printed sheet of addresses and a pack of 20 slips of paper about 3×5 . These are most conveniently handled in an envelope on which there is a printed blank for the record, or otherwise an extra slip of paper may be distributed and rubber bands used to hold the slips in a pack.)

Step 1. On the envelope (or on a blank slip, writing the long way) write your name on the first line, on the second line write the school, class, and date. Then number the blank slips from 1 to 20, in the upper right-hand corner, large and plain.

Step 2. When I give the word to start, copy the addresses on the blank slips of paper as if you were addressing an envelope, placing the name on one line, street address on the next, city or town on another, and state on a separate line at the bottom. Omit commas at ends of lines, but not periods for abbreviations. Copy only one address on one slip, doing as many as you can in good style in 10 minutes. If you have time to write more than twenty addresses, turn over the last slips and continue addressing till I say stop. You can number these after the test is finished. (Use watch with second hand and time the test exactly.)

Step 3. On your record blank on the fifth line (passing over the third line left blank for the name of the person

TWO SERIES OF TESTS

who checks and the fourth line left blank for the person who rechecks) write after the word "Speed" the number of the last address you have written, omitting the last address if you have written only the name, but counting it as one if you have written the name and also the street address if there is one, or the town or city.

Step 4. Our next test will be one on filing. If you have not written as many as twenty addresses, write the town and state now, up to and including slip 20, making crosses for the names to show you did not write these during the ten minutes. I will give you two or three minutes if necessary to complete twenty addresses.

Step 5. Now you will be allowed two minutes to arrange the first twenty addresses (disregarding any you have written beyond twenty) in alphabetical filing order according to states, towns, and names (what is called geographical filing). Regard letters for states as you find them abbreviated, not in the alphabetical order they would be if spelled out. When I give the word, start.

Step 6. Write the numbers of the cards, with a comma between, as you have them now arranged, on the blank line at the bottom of your record envelope (or slip), below the blank line where you will later write the number of "Errors in Filing."

Step 7. Rearrange your slips in order as they are numbered from one to twenty and put them back in the envelope (or put rubber band around them), and exchange. When you have received another's pack, write your name on the third line after the words "Checked by."

Step 8. As I read the addresses I will pronounce the words in each line and then spell them, calling your attention to any unusual spelling. Place a small, heavy cross just below each letter or figure that you find wrong. If a period has been omitted for an abbreviation, you may

COMMERCIAL TESTS AND HOW TO USE THEM

make a cross for that, but do not make crosses for commas, whether they are inserted or omitted. (In first series lay special emphasis on double *s* in Douglass in No. 2, *e* in Franklen in No. 3, one *t* in Janet in No. 4, one *n* in Herman in No. 6, middle *o* and *e* in Bartholemew in No. 7, one *s* in Douglas in No. 9, *e* on end of Harte in No. 15 and spelling of Prairie, *e* in Marten in No. 17, *es* in Frances in No. 18, one *t* in Abbot in No. 19, *is* in Francis in No. 20, two *n*'s in Hermann in No. 24. Second series: *like* in No. 1, two *n*'s in Bannermann in No. 2, and Purcell with a *c*, two double *e*'s in Beebee in No. 3, one *s* and two *z*'s in No. 5, *s* on Howards in No. 7, two *n*'s in Glenney in No. 8, one *n* in Bannerman in No. 9, *psch* in Kelpsch, and *ck* in Turck, two *t*'s in Harriett in No. 11, Lane in McLane in No. 12, and *son* in Anderson, while in No. 13 Andersen has *sen* and Hathorne has *Ha* and *e* at the end, in No. 15 Smithe has *e* at the end and *i* in the middle, in No. 19 Martendale has *ten*.) Look carefully to see if additional addresses have been written on the backs of any of the slips. Be sure all names and abbreviations are capitalized, including "St." for street, "Ave." for avenue, etc. (Teacher will find it convenient to mark the test paper itself by drawing a short line under each peculiarity of spelling noted above.)

Step 9. Count up the crosses for errors which you find and write the number after the word "Errors" in the right-hand half of the fifth line (same as that on which "Speed" has already been written). Then make sure that the number of the last card on which a full address is written has been entered as "Speed." (If there is any difference, ask why the owner wrote a different number.)

Step 10. Now check the numbers of the cards for geographical filing as you find them written at the bottom of the record. Place a small, heavy cross under the

TWO SERIES OF TESTS

number of any card which is not in the order as I read : (First series) 8, 5, 1, 7, 17, 15, 18, 3, 11, 20, 10, 13, 16, 6, 14, 19, 12, 9, 2, 4. (Second series) 9, 5, 12, 3, 4, 7, 17, 18, 13, 2, 15, 16, 19, 8, 6, 10, 20, 14, 1, 11. Now count up the crosses and enter the number after "Errors in Filing" in the line above.

Step 11. Return the cards to the envelope (or rubber band) and exchange again. Be sure you do not have your own pack or the pack you have just marked. Write your name on the third line of the record after "Re-checked by." (Teachers should see that especially slow pupils exchange this time with quicker ones.)

Step 12. Take your printed test sheet on which you find the addresses and compare each address carefully one at a time as I call the numbers, observing capital letters, abbreviations requiring periods, and particularly the spelling of names as I call attention to peculiarities. (Here go over again the peculiarities of names in Step 8 as you come to the addresses mentioned.) If you find a cross under anything that is right, draw a circle around it. Mark with a small, heavy cross any letter, figure, or punctuation mark which you find is wrong but not marked. If an error is already marked with a cross, do not make a second cross.

Step 13. Count up all the crosses (not including those you have circled) and see if the count agrees with that already entered on the record after "Errors." If it does not, count again and when you are sure you are right, cross out the wrong number thoroughly and write in the correct number. Then see that the number on the last regularly addressed slip is entered as the "Speed."

Step 14. As I read again the order of the numbers of the cards for alphabetical filing according to states and towns, see that a cross has been placed below any number

COMMERCIAL TESTS AND HOW TO USE THEM

that is wrong. If a cross has been placed below a number that is right, draw a circle around it. Do not make a second cross for an error already marked. (Read the numbers in order again.) Now count up the crosses, omitting those that have been circled, and see that the count corresponds to the number already written after "Errors in Filing" in the line just above the row of numbers. If your count does not agree, count again, and when you are sure you are right cross out the first count thoroughly and write in the correct number.

Step 15. (If there is time, at the end of the period, otherwise at the next period, all packs of slips having been taken up) return packs of cards to owners. We will give them a few minutes to see if they have been fairly marked. Then as I call the roll let them give their records as "Speed 18, Errors 2, Filing Errors 3," or whatever it may be.

GRADING THE PENMANSHIP

Quality of penmanship may be judged according to the Ayres Gettysburg scale, but it can be considered only in connection with the speed, and the speed for half an hour may be required to show whether quality can be maintained at normal speed. Judge the quality by comparison with the scale on the tenth card. Only an experienced judge of penmanship can do this. The record can be made on the same blank following the record on addressing for speed and errors. The New York City (Lister) scale may be used in place of the Ayres, or the Ayres Three-slant scale will serve.

Ayres' quality 90 may be called "Excellent — 5"; quality 70, "Good — 4"; quality 50, "Fair — 3"; quality 30, "Poor — 2." Closer marking will not be worth judging for business men considering applicants.

VI

MEASURING CLASSES AND TEACHERS

THE tests in this book have been designed primarily for classroom use in measuring scientifically the individual work of pupils. The pupils and the teacher do the work together, instead of throwing all the work on the teacher.

When these tests have once been used, they cease to be a safe measure for superintendents or principals in certifying pupils to business men, or in getting reliable records for the comparison of classes and teachers in a school system. For this purpose fresh secret tests, carefully balanced in difficulty against the model tests, yet different in material, must be provided. So great is the difficulty of getting an exact balance that only an expert is likely to be successful. For this reason the material for the international typewriting tests (and all other sanctioned typewriting tests) has been prepared by J. N. Kimball. The fresh series of the National Business Ability Tests are also prepared by one person. They are then tried out secretly on business employees, carefully corrected, and furnished to schools much as weights and measures are certified by a Bureau of Standards. One prime object of standard tests is to reduce to a minimum the variable judgment of different teachers, however expert.

TESTS GIVEN BY SUPERINTENDENTS

When the secret test papers have been obtained, put up in packages of 50, each package complete with directions and tabulating blanks, a day will be set for the tests and the superintendent will call in a sufficient number of principals, assistant principals, or head teachers, who will act as examiners for the different classes. These will

COMMERCIAL TESTS AND HOW TO USE THEM

be assigned to classes and schools different from their own, and directions for giving the tests will be handed them and they will go over them with the superintendent to be sure everything is clearly understood. Arrangements will be made for sending the tabulating blanks to the teachers in advance so that the names of pupils may be copied preparatory to the test. It will be an excellent thing if the superintendent will ask teachers who are to give a test to take the test with him, just as if they were pupils, using a model test from this book. The directions with the secret tests will be identical with those here given, except for change of key. By taking a test teachers will learn how to give it, in half the time they will by listening to explanations. It is not necessary to give a whole test, however.

Experience has shown that teachers should not be allowed to give their own tests, as they are inclined to strain a point to make the conditions favorable for their own classes. As the teacher tests the pupil, so the superintendent should test the teacher and the class.

When the test is in progress, the teacher should devote her attention to discipline, while the examiner conducts the test. When it comes to marking the papers, pupils should then have all the help that can possibly be given them, and the teacher may be allowed to conduct the checking, as her voice and manner may be more familiar to the pupils. Or she may go about among the pupils and observe their work individually, always explaining anything that does not seem quite clear. In sending out examiners, a careful superintendent will select good disciplinarians for classes where he knows discipline is likely to be weak, and will send the less efficient disciplinarians to classes whose teachers he knows to be strong in discipline.

MEASURING CLASSES AND TEACHERS

With the smallest possible delay, the person who is to give the tests begins to read the directions, pausing after each step for the pupils to do what they are told to do. Normal, reasonable time should be allowed. There should be neither hurry nor dragging.

Observe that neither teacher nor examiner is allowed to answer any questions about the test, or to make any explanations; but the directions may be reread as many times as may be necessary, and any emphasis in reading that will make the meaning clearer is allowable and even desirable. In answer to all other questions the answer must always be, "I cannot answer your question. You must use your own best judgment." This should be spoken in a kindly, encouraging tone.

It is desirable that during the test the atmosphere of the classroom should be as nearly normal as possible. The tone of the examiner should be sympathetic. Nothing should be allowed to frighten, worry, or irritate the pupils, yet no levity or lack of respect should be permitted. An air of quiet dignity and importance should prevail. Before the test the windows may be thrown open for two or three minutes, and the pupils given deep-breathing exercises. It may be said, however, that the writer has not noticed that physical conditions materially affect the test records.

When tests require exact timing, as the arithmetic tests do, a stop-watch or watch with a second hand must be used and the time kept to a second. If for any reason the timing is inexact, the record should be thrown out. In case of tests such as the English tests, which are simply intended to be given in normal time, three or four minutes over should be allowed if pupils have not quite finished, and incomplete papers should be recorded as having "no grade." There will be no measure of knowledge of

COMMERCIAL TESTS AND HOW TO USE THEM

grammar if the paper is not finished. Warning should be given five minutes before the close, and then two minutes before the close. Finally, if any pupils have not finished, two or three minutes additional should be given.

GRADING THE TESTS

When the test has been given under very rigid test conditions, the grading should be carried on in a relaxed atmosphere of utmost helpfulness. The pupils' power of correcting is not being tested, and like clerical workers in an office they should be handled so as to get the work done in the most efficient way. The teacher who is familiar with their habits must be very active, and every effort should be made to put the pupils in a frame of mind to coöperate heartily. The work should not be hurried too much, and all questions should be answered very fully on this part of the work.

The papers of pupils who do not seem to be doing good work on the first correction should be handed to the most alert and capable pupils for rechecking. The teacher should look out for this sharply.

TABULATING THE TESTS

Pupils have a tendency to mark too severely, marking as errors trifling irregularities which are not vital. Or they are so intent on looking for errors that they will not notice on rechecking correct points that have been erroneously marked.

To offset this, papers may be returned to the owners to look over. This is an excellent opportunity to discuss the reasons for things, and questions should be answered freely. At the same time, pupils should be strictly forbidden to make any marks whatever on their papers.

MEASURING CLASSES AND TEACHERS

All errors should be corrected or changes made by the examiner (not by the teacher).

It will be best for the teacher to call the roll and let pupils give their own scores. They will feel better to give their own records, and will be more likely to remember them. The teacher may suggest that they copy them for their own reference. As the roll is called, if a pupil hesitates or seems in any doubt, the examiner should at once look at the paper and see if there is any irregularity about the marking. Most irregularities will come out at this time and can be corrected on the spot if teacher and examiner are alert.

At the close, the examiner should take up all the papers, including any blank papers left over or spoiled, and take everything at once to the office of the superintendent or principal.

Under this plan teachers and examiners are completely relieved of the burden of looking over papers outside the class. Rigid adherence to the method here outlined, the author fully believes, will yield more accurate results than having teachers correct papers under the usual pressure. The minds of teachers are not favorably disposed toward work outside the class, and they have a tendency to hurry, and to depend too much on their individual expert judgment. It is almost impossible to make teachers follow uniform rules. Where an examiner, a teacher, and pupils work together, however, there will not be a deviation of so much as a jot from the standard uniform system of procedure.

In addition, the following solemn affirmation signed by the examiner and the teacher, and handed to the superintendent with the test papers, will emphasize their serious responsibility for the tests, especially to the outside public:

COMMERCIAL TESTS AND HOW TO USE THEM

I solemnly affirm that the National Ability Tests in
..... (mention subject) were given to Class.....
at School on (date) in strict
accordance with directions, and I believe the results are
fair and honest in every respect.

Signed by Teacher

Signed by Examiner

INSPECTION OF PAPERS

All records should be made in number of errors, not in percentages, and teachers or examiners should not be asked to get averages or medians, or to inspect papers. This is a clerical job, and can usually best be done by a trained stenographer or bookkeeper. The only thing required is to make sure that directions have been followed, and the clerical worker will be most accurate in checking up this fact. Such a person outside the teaching force will also be most free from suspicion of favoritism.

The inspector must first become thoroughly familiar with the directions, and should mark the test papers from the key, by way of memorizing the correct forms given in the key. Another paper may be corrected, in a second effort, by way of fixing the important points in mind, since memory must be largely depended on for rapid work.

Random papers in each class should be looked over carefully to see if directions have been followed and if pupils have been reasonably efficient. A few errors will be found, but if they are not sufficient to change the average of the entire class as much as one point, they may be disregarded as insignificant. Errors tend to offset each other, — points overlooked by points that are right but marked as wrong. There is an inevitable margin of variation of 2 or 3 per cent either way, and a variation of no more than 1 per cent will not mean anything.

MEASURING CLASSES AND TEACHERS

Over-conscientious inspectors are sometimes unduly worried by finding a few errors. If they will correct all the papers in one class and see how little difference it makes on the totals, they will get a proper sense of the proportionate significance of such errors.

The great thing is to see whether the teachers have failed to follow the directions so that certain classes of errors run through many papers. If too many errors appear, all the papers may be thrown out. Inspectors cannot be asked to regrade papers.

Once the system is in good working order, the inspectors will be occupied chiefly in finding the averages or medians and tabulating the class records. The author found that five minutes to a class of forty pupils was sufficient for a record of the three elementary arithmetic tests, or the tests in grammar and punctuation given at one time. Ten minutes to a class would be a large allowance, and if more is required, something is wrong. That means from half a day to one full day for the arithmetic records or the English records of 1000 pupils in 25 or 30 classes, and of double that time for both series.

FINDING THE MEDIAN

We all know what "averages" are. The errors of all pupils in a class are added up and divided by the number of pupils. The result is the "arithmetical mean" or average number of errors per pupil.

It is considered fairer to the teacher to judge by the middle 50 per cent of the class, excluding consideration of the extremely brilliant or the extraordinarily dull, who might unduly raise or lower the average of the class. For a similar reason, the "median" or middle grade is preferred to the average in most cases. This means that if the pupils are arranged in order of merit, the score of

COMMERCIAL TESTS AND HOW TO USE THEM

the middle pupil will be taken as the median, and there will be an equal number who are better than he and who are worse than he. If there are 35 in a class, the 18th pupil counting from either end will have the score which is accepted as the median, or a substitute for the average. Pupils who make an atrocious number of errors will not affect the class standing any more than those who make one or two more errors than the median, and a certain element of unfairness to the teacher and to the majority of the class is removed.

Moreover, in ordinary practice the median is found with great speed when the inspector knows just how to proceed.

To get the theory, we may take a class and first find out how many pupils there are in half, or what is the number of the middle pupil. If there is an odd number there will be a middle pupil, as, in the case of a class of 35, it will be the eighteenth pupil. If there is an even number there will be two middle pupils and the median will be the average of the two,—in a class of 36, halfway between the eighteenth and the nineteenth.

Then we will make a tabulated list, first counting up the number of pupils who have made no mistakes, then the number who have made one mistake, and the number who have made two mistakes, etc., so that we shall have a table like the following :

0 errors, 2 pupils	8 errors, 3 pupils
1 error, 3 pupils	9 errors, 1 pupil
2 errors, 3 pupils	10 errors, 2 pupils
4 errors, 4 pupils	11 errors, 1 pupil
5 errors, 2 pupils	12 errors, 2 pupils
6 errors, 5 pupils	13 errors, 2 pupils
7 errors, 4 pupils	14 errors, 1 pupil

Total, 35 pupils

Median, 18th pupil, one of the 5 who made 6 errors

MEASURING CLASSES AND TEACHERS

Since there are five pupils who made six errors, of whom three stand in the half of the class that made fewer than the median and only one in the half that made more than the median, some statisticians have proceeded to get a "true median" by taking $5\frac{1}{2}$ and a fraction that will represent the distribution of those who have just 6 errors. This is of importance when dealing with groups in large tabulations, as all between 75 per cent and 80 per cent. In that case a more exact median may be found by taking a midpoint proportionate to the number above and below. Some others, as for example S. A. Courtis, instead of averaging the two middle pupils in an even class, take the lower score, but little is saved by that.

In practice it is not necessary to make a table of the sort shown. The experienced inspector will soon be able to look down a column of scores and see by inspection that the median must be about 6. He will then start in and count up all scores of 6 or below, getting a total of 19, which is just one above the 18th or median-score pupil. He will then glance back to see that there are enough scores of 6 so that the 18th pupil will be one of them, and will write down 6 at the foot of the column as the median. If he had chosen 5 and had been able to count up only 14, he would then have proceeded to go over the scores again to count also the 6's, until he came to 18 counts. On this plan the median of a class of 40 can be found in less than a minute, often in half a minute.

COUNT OF ERRORS AND PERCENTAGES

Simple count of errors is very much easier to handle in the class and in making up statistics than percentages formed by deducting so many per cent for each error, and on this plan far fewer mistakes will be made.

But when it comes to interpreting and comparing results

COMMERCIAL TESTS AND HOW TO USE THEM

it is very desirable to have the different tests in the same terms, even if the standards of what a normal pupil should do are different, since improvement will at least be measured in the same terms. The National Tests have been made up on a mechanical system, usually of fifty points, — in the case of grammar and punctuation divided up between elementary and advanced, 20 points in the elementary grammar and 30 points in the elementary punctuation. Other tests, however, cannot be scored on the percentage plan, as for example arithmetic. You can get nothing better than the mere count of figures in all answers for the speed, and figures wrong for the errors.¹ The relation between total figures and figures wrong might be expressed as percentage of accuracy, and Courtis uses a rough table for finding this percentage. The present writer believes that the ordinary person can figure that percentage for himself by inspection so well that the great labor of calculating it exactly is not worth paying for.

To change count of errors into percentage, the inspector may use the following tables. As soon as he finds the median number of errors, he will look in the table and write below the median number of errors the corresponding percentage.

¹See shortened Courtis Tests in Arithmetic on page 88.

MEASURING CLASSES AND TEACHERS

DEDUCTING 2%		DEDUCTING 3%		DEDUCTING 3½%		DEDUCTING 5%	
ERRORS	%	ERRORS	%	ERRORS	%	ERRORS	%
1	98	1	97	1	97	1	95
2	96	2	94	2	93	2	90
3	94	3	91	3	90	3	85
4	92	4	88	4	87	4	80
5	90	5	85	5	83	5	75
6	88	6	82	6	80	6	70
7	86	7	79	7	77	7	65
8	84	8	76	8	73	8	60
9	82	9	73	9	70	9	55
10	80	10	70	10	67	10	50
11	78	11	67	11	63	11	45
12	76	12	64	12	60	12	40
13	74	13	61	13	57	13	35
14	72	14	58	14	53	14	30
15	70	15	55	15	50		
16	68	16	52	16	47		
17	66	17	49	17	43		
18	64	18	46	18	40		
19	62	19	43	19	37		
20	60	20	40	20	33		
21	58			21	30		
22	56						
23	54						
24	52						
25	50						
26	48						
27	46						
28	44						
29	42						
30	40						

INTERPRETING RESULTS

In the case of all standard tests, all results are to be judged by comparison with standard averages obtained from testing large numbers of groups known to be representative.

The writer has found that many small groups selected

COMMERCIAL TESTS AND HOW TO USE THEM

as representative are far more satisfactory than very large groups as they come at random. Thousands of pupils in New York City will average up very much alike, in spite of vast differences between individuals. Then go to some other city and thousands of pupils will average up quite differently.

Averages to be used as standard for comparison should be collected through expert selection so as to get only what appears to be the typical or normal on several considerations.

Then all grades will be judged by comparison with this standard.

For example, in elementary spelling satisfactory beginners in business offices seem to average about 90 per cent, and so in spelling on this test 90 per cent may be counted fair; high-school graduates average 95 per cent, and this may be counted good; while experienced employees average about 98 per cent, and this may be considered excellent. On elementary grammar, however, satisfactory beginners average 72.5 per cent; high-school graduates, 81 per cent; and experienced employees, 95 per cent; and these become the standards for fair, good, and excellent. On punctuation, again, the standards seem to be 60 per cent, 73 per cent, and 73 per cent. Ninety per cent in spelling is no higher than 60 per cent in punctuation.

At the same time, as each of these tests contains 50 points that ought to be known to the satisfactory business worker, each perfectly natural and reasonable, we may fairly say that in general, while the difficulty of the tests may differ somewhat, the country as a whole and schools on the average are more efficient in spelling than they are in grammar or punctuation. The author believes that punctuation is not well taught in American schools, and

MEASURING CLASSES AND TEACHERS

there is considerable evidence that while correct grammatical usage is learned in business, there is very little improvement in punctuation after pupils get into business.

To help the ordinary untrained person to understand averages in an Efficiency Employment List, therefore, it is well to attach to the figures such rough descriptive terms as "Fair," "Good," "Excellent," and "Deficient" or "Poor." These may particularly well be attached to simple counts of errors when no percentages can be figured.

THE SCALE OF 5

All scales for measuring mental products are subject to inaccuracy through accidental circumstances, and results cannot be applied too rigidly. In the case of individuals, the writer does not believe that a classification closer than a scale of 5 is usually reliable, certainly not when the judgment of any individual grade-marker must enter in. This may be expressed as Failure — 1, Poor — 2, Fair — 3, Good — 4, and Excellent — 5, allowing a range of one half point above and below and sometimes going so far as to express this as Fair — $3\frac{1}{2}$. The words would then be the working guide in forming a judgment, and the figures could be used in getting averages. The United States army intelligence tests are rated on practically the same scale, including C + and C- corresponding to $3\frac{1}{2}$ and $2\frac{1}{2}$ when C is Fair — 3.

The percentage scales could be turned into the scale of 5 like this by taking the average for beginners in business as Fair — 3, the average of high-school graduates as Good — 4, and the average of experienced employees as Excellent — 5. In this way the ordinary outsider would often get a better idea of scores than from comparing percentages with standards, a slightly complicated process,

COMMERCIAL TESTS AND HOW TO USE THEM

and teachers and pupils would not overvalue slight differences which really have no significance.

These remarks apply to judging individuals.

CLASS MEDIAN MORE EXACT

When you put twenty or more individuals into a class group, the accidental variations up or down tend to offset each other, and the class median is much more finely significant; in the case of many classes averaged together it is very closely significant. Yet even here a variation of 3 or 4 per cent may be without any intelligible meaning. Differences of 1 per cent are to be taken seriously only when entire cities are compared.

In the case of individuals it has been generally recognized by psychologists that conclusions should never be based on a single test. One writer says that at least two tests should be given. The present writer has used ten different tests given at three different times, or in three groups, and this series taken as a whole is very reliable. Probably not less than three tests from different points of view at different times may be regarded as a safe working minimum for judging school work and general intelligence.

EDUCATIONAL TESTS AND INTELLIGENCE

Business men want some sign of quickness of intelligence and of faithful, patient industry. These may be measured by the tests on tabulation (mental alertness) and reproducing instructions; but single tests of that sort are considerably less reliable than series of educational tests. All standard educational tests of speed and accuracy in doing things may be interpreted to show intelligence and patient industry, on the scale of Fair, Good, and Excellent.

To judge these qualities proceed as follows:

MEASURING CLASSES AND TEACHERS

First, get the class medians of arithmetic and English. These will show what training the average pupil has had.

Quickness may be judged by the comparative speed in arithmetic, that is, by comparison of the individual score with the median of the class, not with the standard average; also taking into account accuracy. If the speed and accuracy in arithmetic are comparatively high, and the scores in the various English subjects are also high, or high with only one exception which may be accidental, the quickness of intelligence may be rated high, and industry is probably high, too. If the speed in arithmetic is low but the accuracy is high and English subjects are high, the patient industry may safely be reckoned high though the mental quickness is low. If the speed is high and the errors high, we judge that speed was attained at the expense of accuracy and the patient industry certainly is low. If English subjects are high in such a case, we suppose that pupil does not have a talent for arithmetic, or has not been correctly trained.

Speed in addressing is a good measure of general quickness to confirm speed in arithmetic, as it is of an entirely different mental character. Of course we must never forget that good penmanship, and even speed in penmanship, accuracy in arithmetic, etc., depend chiefly on good teaching; but when all the individuals in the same class have had the same teaching, we may consider individual differences as indicating relative intelligence.

MEASURING IMPROVEMENT

In order to measure improvement we need two parallel series of tests of equal difficulty, one to be given at the beginning of a period of work and the other at the end, and it should be a matter of indifference which test is given first.

COMMERCIAL TESTS AND HOW TO USE THEM

In the past, teachers have made their examinations progressive, and have given them only at the close of the period of study. There was therefore no real measure of improvement at all except as the judgment of the teacher expressed itself in the marks of the pupils. Good pupils might accomplish nothing during the period, being marked equally high at the start and at the finish, and poor pupils might make a great improvement and yet not come up to the teacher's passing grade; or if they were able to squeeze through, they were content to remain on that low level.

At first educators were inclined to apply parallel standard tests unexpectedly, in an effort to measure normal progress in developing ability; but teachers were always suspecting what was coming, and some of them sacrificed everything else to give time to developing the special ability that was being tested.

Clearly it is very unfair to neglect the time element. In all records of improvement the time in the classroom, and also the time spent by pupils outside the classroom in preparation, should be given as exactly as possible. The only way in which this can be done uniformly and exactly is to allot a certain period, say five or six weeks, to intensive work on the subject to be tested and let all teachers alike devote their entire class time to the work during that period. Thus the vicious habit of slighting other work so as to steal a march on competing teachers or classes in public contests, which has been so serious an evil in connection with the old typewriting contests, is forestalled.

Exact records of improvement offer a much fairer basis for satisfactory school grades than the old system. If bright pupils do not work hard and demonstrate improvement, they should not be marked high; and if poor pupils

MEASURING CLASSES AND TEACHERS

demonstrate improvement, they should be given credit accordingly, even if still below the average, for steady improvement will in time bring them up to standard. It is somewhat easier for poor classes or poor pupils to show improved marks than for classes and pupils at first ranked high, but on these standardized tests this difference is not nearly so great as in the case of marks given by teachers on their expert judgment. The author has found very poor classes quite often making the greatest improvement records, and quite as often the very highest classes at the start have made the second highest improvement.

The fairest measure of improvement seems to be advancement from one standard, as of beginners in business, to another standard, as of high-school graduates in business. Percentages showing how much the second test marks are above the first test marks are fallacious. In the case of fundamentals, where a collection of facts in minimum essentials needs to be mastered and each 2 per cent or 5 per cent means one more fact understood and reduced to practice, mere progress up a percentage scale seems the fairest measure of improvement, as from 60 per cent to 80 per cent is 20 points of improvement, and from 70 per cent to 90 per cent is also 20 points of improvement, though from 80 per cent to 100 per cent might be considerably harder to attain than from 80 per cent to 90 per cent. Those who reach or approach 100 per cent should have a chance at a more advanced test, the improvement on which should be added to the improvement on the test on which they attained 100 per cent or near to it. The device of the advanced tests corrects the inequality almost entirely.

COMMERCIAL TESTS AND HOW TO USE THEM

"DISTRIBUTION OF FREQUENCIES" SHOWN BY GRAPHS

One of the most serious problems for public schools with large classes is keeping the pupils properly graded, or taking care of the bright ones at the top and the dull ones at the bottom when the instruction is of necessity aimed at the average.

The table on page 182 shows how many pupils made each different number of errors, or how "frequent" a score of four errors was, or a score of six errors, etc. This column of the number of pupils is called the "frequencies" in technical statistical language. We see that the number of pupils toward the middle is generally larger than toward either end; that is, there is a "central tendency" in the class, and the median shows that central tendency. At the top of the column the variation in number of pupils is fairly steady, increasing toward the middle except at one point. Toward the bottom there is more irregularity and less central tendency. This "distribution of frequencies" shows a class that is not very well centralized; that is, is poorly graded. Since the instruction in a large class is almost necessarily aimed chiefly at the average, it is a little wrong for all who are not exactly at the average point, as, in this case, for 5 who have a score of 6 errors. For those who are near the median or average, the error is not great, but for all who are near the extremes above or below it is a serious matter, and usually means considerable loss of efficiency in their class work. The distance from the central point is called the "deviation," and the median deviation will be the quartile range, — the difference between the point below which 25 per cent of the class stand and the point below which 75 per cent of the class stand divided by two, or half of the middle 50 per cent of the class (sometimes called the "probable error").

MEASURING CLASSES AND TEACHERS

This distribution is best shown by a graph, which also can easily be adapted to showing the improvement and the variation from the normal average.

For all graph work we require paper faintly ruled off in small squares, representing our units.

It will be much easier to confine ourselves to count of errors instead of taking the corresponding percentages with their larger numbers.

Two scales are laid off, one along the bottom of the figure, which usually will represent number of errors, and one vertically at the left-hand side, which usually will represent number of pupils. As the horizontal and vertical units are entirely different, we can vary them by grouping as we may find it convenient in keeping the figure on the paper. If we have a small class with no more than 10 pupils in the largest group, we may use 1 pupil as the vertical unit. If we have larger groups so that as many as 100 pupils may be in one group, we can take 10 pupils as the vertical unit, so that our graph will not go any higher with 100 pupils than with 10.

The first step always is to make a table showing how many pupils scored each successive number of errors of whatever it may be from 0 to the greatest number in serial order.

We then make on our graph a dot at the point of intersection between the number of errors and the number of pupils as shown in our table.

The simplest way is to connect these points with a continuous line. This line forms the "frequency polygon." Another polygon may be plotted on the same graph, the points connected by a dotted line, to show either the improved standing on a second test or the average of a school system, etc.

Another even better visual method is to erect columns

COMMERCIAL TESTS AND HOW TO USE THEM

that will occupy the width of one unit, and reach a "level" opposite the number of pupils. Where columns overlap,

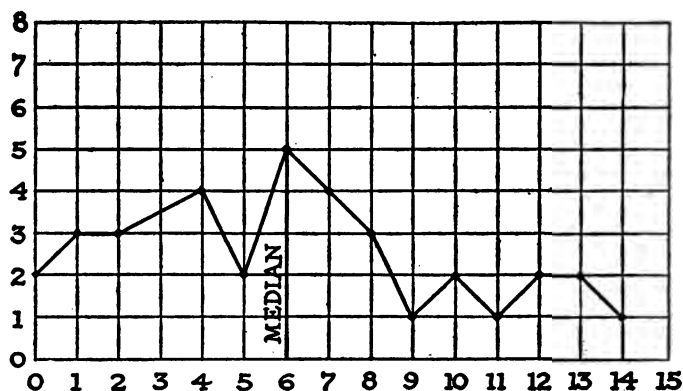


FIG. 1. Polygon of table on page 182; errors counted horizontally, pupils vertically.

part may be made solid black to show the results of one test and the other part may be made as an outline to show the

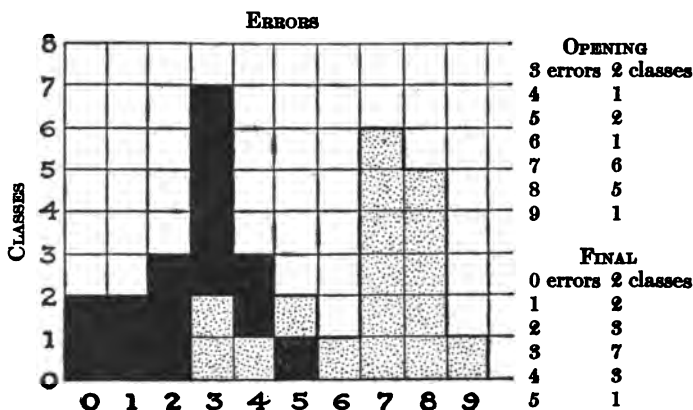


FIG. 2. Graph of 18 Gary classes in elementary grammar. Light columns show opening test (distribution somewhat skewed); black columns show final test after five weeks of drill (distribution nearly normal).

MEASURING CLASSES AND TEACHERS

results of another. These levels are connected up with vertical lines and thus another style of "polygon" is formed.

When speed and accuracy in arithmetic are to be judged jointly, we may take points of speed as the unit for our base and points of accuracy for our vertical, and make a heavy dot at the intersection for every pupil or class or school. For this we do not need to make any preliminary table. The distribution can be seen by observing how far each dot is from a diagonal line, or curved line, represent-

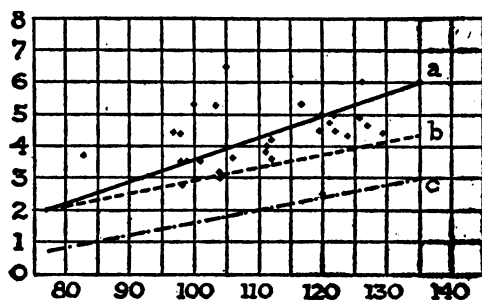


FIG. 8. Correlation of errors and speed in arithmetic for 32 Brooklyn schools (page 212). Vertical scale shows errors; horizontal scale shows speed. The correlation line *a* is drawn from lowest speed with lowest errors to highest speed with nearly highest errors (one freak in high errors ignored), while the dash line *b* shows uniform percentage for increased speed, and dot-and-dash line *c* indicates the business standard of accuracy in relation to speed, attained by only one school. The tendency to sacrifice accuracy to speed is very apparent.

Sr.	Errs.
104	3
112	3.65
121	4.75
127	4.33
111	3.9
116	4.7
100	5.2
111.5	4
98	4.4
97	4.46
88	3.75
99	3.5
103.7	5.25
106	3.6
124	4.4
119.5	4.5
122	4.5
120	2.5
105	6.5
122	5
98	2.86
98	3.5
125.5	4.93
117.5	5.33
101	3.5
77	2
112	4.2
120	5
126	6
135	6
104	3.1
129	4.45

COMMERCIAL TESTS AND HOW TO USE THEM

ing a normal correlation. This diagram is used to show correlation of any two different tabulations expressed in different units of value, as, for example, the relation between test records and teachers' marks, as well as the relation between speed and accuracy in arithmetic.

HOW TO PREPARE AN EFFICIENCY EMPLOYMENT

REGISTER EASILY

Pupils who take technical courses and finish them get splendid help in finding good positions. The many thousands who drop out from the seventh grade to the end of the high school and do not take technical courses get no help at all. They are absorbed into business in a haphazard way which is exceedingly costly to business, and very unfair to the pupil. These pupils go to make up the 75 per cent of general clerks and office boys.

The chief vocational asset of these pupils is their greater or less accuracy in performing common operations, which can be measured by the National Tests. Here is the easy way to manage that.

Twice a year, about the middle of each semester, test all pupils in those classes from which any considerable numbers will leave to go to work. The testing is done as has been described in detail in this book.

Hand out slips like the following to such pupils as say they may leave school to go to work by the end of the semester.

The top of the slip is perforated so as to make a card 3×5 inches when torn off, and contains the name and address of the pupil. The lower part contains his record as made on the tests, and answers to some questions which business men will wish to have. A duplicate numbering machine places the same number on the upper part and on the lower part.

MEASURING CLASSES AND TEACHERS

No.

Do you expect to leave school to go to work by the end of this semester?

.....
If so, fill out this blank and get free employment agency service, with chance at highest wages.

Name

Home address

Borough

Nearest

School Home Tel. No.

[Perforation. Upper portion will make an alphabetical card index.]

..... No.
Age Nationality of Parents

At the close of each test write in the proper space below number of errors, and speed if called for, and ATTACH THIS SLIP TO YOUR TEST PAPER for inspection.

Addition		Fractions		Percentage	
Speed	Errors	Speed	Errors	Speed	Errors
.....					
Speed	Addressing Errors	Fil. Ers.	Adv. Spell. Errors %	El. Spell. Errors %	
.....					
Elem. Gram. Errors %	Adv. Gram. Errors %	Elem. Punc. Errors %	Adv. Punc. Errors %		
.....					

Pupils are not expected to enter percentages, only errors.

Penmanship

Teachers will check each grade inspected as entered above.

Name of Inspector

*Sample of Application Blank for Efficiency Employment Register
(Size, 5 inches wide, upper portion 3 inches deep.)*

Such tests are selected as are most likely to be of value to employers, and to be most quickly and conveniently given by teachers.

At the time of each test the employment application blanks are offered and given out to those that want them.

COMMERCIAL TESTS AND HOW TO USE THEM

At the close of the test they are taken up. Each pupil enters on the blank the record made on the test of that day and attaches the blank to his test papers. These papers with the blanks are separated from the others and the records entered are at once verified by a quick inspection, preferably by a clerk in the principal's office. Then the application blanks are sent to the room where the next test is to be given, so that the results of that can be entered by the pupil and the blank attached to his papers. Thus the record he has made can be quickly inspected. Only papers of those who are seeking employment receive this special inspection.

When the tests are finished and all the records have been entered on the application blank, the penmanship teacher will go to the principal's office and judge and enter the grade on penmanship. This is the most laborious thing that needs to be done by any one person. If the numbers are large, the teacher will have to secure assistance.

Next the application forms are reviewed by a reliable clerk. The duplicate numbers are placed on the top and bottom portions. The numbers of errors are changed to percentage where necessary, or an interpretation of Fair, Good, or Excellent is entered in the form in which the record will be published. The top part is torn off and placed in a card tray or file in numerical order. The lower portions, in numerical order, are ready to be copied on a sheet like the illustration as shown for New York.

A few of the best records may be picked out, mimeographed, and distributed to large employers by way of advertising the list; or names and addresses may be written in the Register itself just above the records, as in the following form. Then the 3×5 name slips may be used to form an alphabetical index.

MEASURING CLASSES AND TEACHERS

EFFICIENCY EMPLOYMENT REGISTER FOR.....SCHOOL

School Employment Officer.....School Phone.....

SPELLING	PUNCTUATION	ADDING		FRACTIONS		PERCENTAGE		ADDRESSING			PENMANSHIP
		Speed	Ers.	Sp.	Ers.	Speed	Ers.	Sp.	Ers.	Filing	
No. One, John Boyd, 5	7	Age 16	2	Boys 36	8	Parents, 5	Home 2	Address, 18	Home 3	Home 1	Phone Fair
No. Two, Gerald Murphree, 3	8	Age 12	1	Nationality 30 etc.	6 etc.	Parents, 7	Home 1	Address, 20	Home 1	Home 2	Phone Good

The complete list is copied on the typewriter with as many carbons as may be needed, and these copies are deposited with the most intelligent employment agencies available. Y. M. C. A. employment agencies know most about office help, and can best interpret a record of this kind. The Chamber of Commerce may volunteer to furnish a specially trained person to administer the list.

The existence of the list should be widely advertised in the newspapers. Then telephone calls for help will come to the agencies administering the list, one of which may be the special employment department of the school. A careful record must be kept of all inquiries received, and boys or girls who are placed, so there will not be waste effort in trying to get those already placed. If the list is ready one or two months before the end of the semester when most of these pupils expect to leave, there will be time to work ahead and fill positions intelligently. If the record is not ready till the end of the semester, much of its usefulness will be lost.

Such a list as this can be canvassed for special abilities, and in many cases it will appear that such young people should be kept in school for additional special training. Now too often these boys and girls drop out and the

COMMERCIAL TESTS AND HOW TO USE THEM

teachers or even parents know nothing about it till the position has been found and accepted, and a change of plans is difficult to effect. If the best positions go to the best records on this list, young people will be eager to get on it, and teachers will know in advance that they intend to leave school, and can study their cases before it is too late.

U.S. Employment Service
New York

EFFICIENCY EMPLOYMENT LIST 8th Grade Graduates

February 1, 1918

This is a register of the boys and girls who are obliged to leave school and go to work, made by the Superintendent of Schools with National Business Ability Tests of speed and accuracy in performing common operations of the business office.

Letters from approved employers addressed to any of the key numbers, if enclosed in stamped envelopes, will be forwarded by the U.S. Employment Service to the homes of the applicants, who may be asked to call for an interview. Or on request any school will send selected applicants, each with a certificate showing his test record.

Judge each person listed by comparison of his record with the averages obtained by testing representative employees in the offices of the National Cash Register Co., Burroughs Adding Machine Co., National Clock & Suit Co., Filene's, Swift & Co., Marshall Field & Co., Commonwealth Edison Co., and others, as follows:

NATIONAL AVERAGES:	Elem. Spell.	Elem. Gram.	Elem. Punc.	Arithmetic	Sp.	Ers.
Beginners (Gram. Sch. Grads.)	91%	78.8%	85%	64	1.1	
High School Grads. (Commer.)	98	81	73	112	8	
Experienced Employees	98	95	85			

For grammar school beginners, 91% is fair in spelling, 78.8% is fair in grammar, and 85% is fair in punctuation, according to the difficulty of the test.

KEY: Nationality of Parents--A American, Au Austrian, J Jewish, I Italian, G Greek, Gr. German, R Russian, Ro Roumanian, H Hungarian.
Employment Preferred--M Mechanical, or out of doors, O Office. Arithmetic--"Sp." is speed (number of figures in answers in adding, subtracting, multiplying for nine minutes). "Ers." errors (number of figures wrong).

Key numbers of Applicants	Age	Nationality	Employment Preferred	BUSINESS ACCURACY					Mental Alertness	Fen-ship
				Elem. Spell.	Elem. Gram.	Elem. Punc.	Sp.	Ers.		
Boy No. 1	16	Gr	O	100	95	80	132	2	Excel.	Good
2	16	R	O	98	85	70	68	0	Fair	Excel.
5	16	J	O	96	70	50	112	10	Good	Poor
10	16	J	O	88	75	67	68	5	Fair	Fair
12	16	R	O	76	65	15	100	10	Fair	Poor
21	16	J	O	90	60	80	67	2	Fair	Good
25	16	J	M	94	50	47	67	4	Poor	Fair
Girl No. 100	16	R	O	96	85	70	51	8	Fair	Fair
104	16	A	M	96	85	77	66	4	Fair	Fair
105	16	H	O	98	78	73	84	1	Fair	Good
106	17	Au	M	96	70	83	70	2	Fair	Good
107	17	Au	O	95	80	77	58	7	Fair	Fair
108	16	A	O	88	50	77	57	6	Fair	Fair
110	16	R	O	96	75	67	62	4	Fair	Fair
111	16	Au	O	90	75	73	106	4	Good	Fair

First page of an employment list sent out in New York, changed to show improvements suggested by employers. Grades are actual.

APPENDIX

The following actual records show how single classes, a small school system, a larger school system, and a very large school system may most conveniently be reported.

In grouping, the class is preferred as a unit, since in elementary schools it runs pretty uniformly about 40 pupils and in high schools about 20, and it offers a measure of the capacity of the teacher when a second test is given so that improvement can be measured as well as original ability of the pupils. Comparison of schools may serve to measure the efficiency of principals. In New York it was noticeable that in large schools the classes were likely to average low, while in small schools they averaged higher. Was this due to the fact that the principal had more time to give to individual teachers?

REPORT ON EFFICIENCY EMPLOYMENT TESTS

NEW YORK HIGH SCHOOLS, DECEMBER, 1918

COMMERCIAL GRADUATES

No. PUPILS	SPELL- ING ERS.	PUNCTU- ATION ERS.	ADDING SPEED ERS.		FRACTIONS SPEED ERS.		PERCENT SPEED ERS.		ADDRESSING SPEED ERS.		Filing	PEN- MAN- SHIP
	in 50	in 30	4 min.		5 min.		2 min.		10 min.			
H. S. 186	6	2	24	0	56	5	7	1	20	1	1	Good
76	7	6	24	1	51	7	5	1	20	3	2	Good
41	5	2½	24	½	51	6	6	½	19	1	6	Fair
87	5½	5½	20	½	55	5	6	2	20	2	2	Good

INTERMEDIATE GRADUATES (9th Grade)

128	4	2	16	0		5	0	21	0	2	Good
153	12	6	16	1		3	3	12	4	11	Fair

FIRST-YEAR HIGH SCHOOL PUPILS

561	13½	10	16	1	31	5	5	2	20	5	11	
-----	-----	----	----	---	----	---	---	---	----	---	----	--

The upper half of graduating classes should be entirely satisfactory to business men, as many of them are well above the average of experienced employees; but the lower third of the various classes shows many pupils who ought never to go into commercial work at all, and tests at the beginning of the course would have prevented the mistakes thus made. These tests sift out those who would be a clog to business.

New York high schools stand very high, and one intermediate school stands practically at the highest level of high school graduates.

APPENDIX

REPORT OF J. W. GROVES, SUPERVISING PRINCIPAL, ONTARIO, CALIFORNIA

Special class of those whom teachers thought likely to fail to pass county board examinations for graduation. Tests given before and after drills of 15 minutes a day on each subject for 5 weeks. All but 5 passed county board examination.

NAME OF PUPIL	SPELLING		GRAMMAR		PUNCTUATION	
	Elem. %	Adv. %	Elem. %	Adv. %	Elem. %	Adv. %
Harold . . . 1st test	98	38	45	67	23	
2d "	92	64	80	62	65	64
Eta . . . 1st "	84	26	40	73	19½	
2d "	66	34	60	58	29½	32
Naomi . . . 1st "	100	36	40	64	26½	
2d "	98	60	90	52	16	24
Richard . . . 1st "	76	42	45	70	0	
2d "	92	42	60	55	40½	32
Gene . . . 1st "	94	38	60	70	61½	
2d "	98	78	60	76	51	46
Perry . . . 1st "	98	38	30	61½	30	
2d "	98	44	58	65	31	44
Rolla . . . 1st "	92	32	35	64	12½	
2d "	96	42	65	60	33½	40
Ebert . . . 1st "	88	32	45	64	0	
2d "	96	46	90	65	44	18
Ora . . . 1st "	94	38	75	67	41½	
2d "	98	76	80	72	65	70
Rose . . . 1st "	94	38	40	55	16½	
2d "	98	56	65	60	45	52
Dwight . . . 1st "	94	56	45	64	37	
2d "	100	78	85	58	62	52
Alex . . . 1st "	96	56	80	51	30½	
2d "	96	84	82	76	58	68
Sylvia . . . 1st "	94	50	35	64	26½	
2d "	98	82	76	65	42	40
Elbert . . . 1st "	98	44	35	70	33½	
2d "	100	58	82	74	73	66
Andrew . . . 1st "	94	52	65	70	0	
2d "	96	74	68	74	58	40

APPENDIX

REPORT OF J. W. GROVES—Continued

NAME OF PUPIL	SPELLING		GRAMMAR		PUNCTUATION	
	Elem. %	Adv. %	Elem. %	Adv. %	Elem. %	Adv. %
Thelma . . . 1st test	100	62	45	73	54½	
2d "	100	98	85	82	90	70
Cecile . . . 1st "	96	50	85	73	23	
2d "	100	84	90	85	67	72
Lea . . . 1st "	100	52	80	70	23	
2d "	100	86	84	62	74	60
Floyd . . . 1st "	94	48	75	85	37	
2d "	100	84	90	85	72	60
Leona . . . 1st "	100	76	70	70	0	
2d "	100	92	84	80	45	40
Ralph . . . 1st "	72	8	25	55	44	
2d "	92	86	80	75	80	70
Walter . . . 1st "	76	26	60	61	16	
2d "	94	72	88	84	68	50
Gilvy . . . 1st "	88	20	40	49	16	
2d "	94	82	86	74	64	70
Milton . . . 1st "	60	12	60	64	0	
2d "	56	8	65	58	0	0
Average before drill . . .	91%	45%	52%	67%	24%	
Average after drill . . .	94%	67%	77%	69%	53%	

APPENDIX

REPORT ON NATIONAL TESTS, RACINE, WISCONSIN, 7TH AND 8TH GRADES SHOWING IMPROVEMENT IN FIVE WEEKS

April-June, 1917

NATIONAL AVERAGES	Elem. Spell.		Adv. Spell.		Elem. Gram.		Adv. Gram.		Elem. Punc.		Full Punc.		Per Cent Impr. in Arith.
Grammar School	84%				61%						60%		
High School	95%		76%		81%		76%				73%		
Bus. Employees	*91%		85%		*72%		85%				73%		
	7th	8th	7th	8th	7th	8th	7th	8th	7th	8th	7th	8th	
Class 1 2d Test	98		88		100		73		69		56		45
" 1st "	92				85		79		60		60		
Class 2 2d "		98		98		100		75		73		63	50
" 1st "		96				90		75		56		49	
Class 3 2d "	98		76		95		73		57		48		33
" 1st "	92		62		75				50		44		
Class 4 2d "		98		62		85		67		70		64	12
" 1st "		88		74		60		70		73		51	
Class 5 2d "	84		46		85		65		65		62		33
" 1st "	80		50		65		70		50		46		
Class 6 2d "	90		51		85		70		63		56		40
" 1st "	86		58		65		64		47		42		
Class 7 2d "		92		54		90		64		75		63	-9
" 1st "		88		56		70		70		50		46	
Class 8 2d "	96		62		95		67		67		74		38
" 1st "	86		56		65		52		53		52		
Class 9 2d "		99		73		95		70		80		80	56
" 1st "		94		76		80		73		60		56	
Class 10 2d "	93		69		95		72		81		75		63
" 1st "	74		62		75		76		63		56		
Class 11 2d "	92		62		95		67		57		49		
" 1st "	80		54		60		64		50		44		
Class 12 2d "		98		94		95		88		97		92	?
" 1st "		94		82		95		85		83		80	
Class 13 2d "	94				95		76		57		50		60
" 1st "	84		54		60		76		57		42		
Class 14 2d "		98		66		97		70		69		58	35
" 1st "		92		72		85		67		57		52	
Class 15 2d "	92		70		70		64		53		36		26
" 1st "	35		82		68		64		37		38		
Class 16 2d "		94		78		90		70		57		47	23
" 1st "		88		70		70		70		53		54	
Class 17 2d "	92		60		85		58		53		42		25
" 1st "	79		56		55		61		50		44		
Class 18 2d "		96		82		95		70		73		60	16
" 1st "		88		65		70		67		60		54	
Class 19 2d "	100				100		100		98		94		81
" 1st "	94		96		85		85		80		76		
Class 20 2d "		100		100		100		100		100		98	50
" 1st "		96		96		95		94		93		88	
Class 21 2d "	92		62		80		55				35		12
" 1st "	84		56		65		64				48		
Class 22 2d "		98		48		95		70		68		59	20
" 1st "		96		66		80		73		60		54	
Class 23 2d "	92		66		90		64		50		44		27
" 1st "	84		56		75		67		37		34		
Class 24 2d "		98		74		95		64		70		60	7
" 1st "		92		76		75		67		58		50	
Class 25 2d "	90		60		90		71		36		32		-29
" 1st "	86		58		75		70		45		44		
Class 26 2d "	91		55		82		61		57		48		21
" 1st "	86		54		75		64		50		38		
Class 27 2d "		94		70		90		67		57		44	25
" 1st "		92		70		70		67		57		55	
Class 28 2d "		96		70		90		73		79		62	23
" 1st "		86		66		70		70		50		52	
Final City Av.	93	96.8	63.6	74.6	89.5	93.6	70	73	61.6	74	53.4	65.3	
Opening City Av.	84.8	91.5	60	74	70	80	67	73	55	62	47	58	34

* Satisfactory grammar-school beginners only. Second test is placed above first test to facilitate subtraction, so that improvement may be seen.

APPENDIX

OPENING AND FINAL TESTS IN LANGUAGE AT GARY, INDIANA

SHOWING IMPROVEMENT IN FIVE WEEKS

February-March, 1917

SCHOOL AND CLASS	ELEMENT. GRAMMAR			ADVANCED GRAMMAR			FULL PUNCTUATION			100-WORD LETTER OF APPLICATION		
	Op.	Fi.	Imp.	Op.	Fi.	Imp.	Op.	Fi.	Imp.	Opening Om.	Final Total Errors	Om.

8TH GRADE—316 PUPILS

School A—160												
Class 14	63	85	22	65	61	—4	43	59	15	1.6	14.2	.66
Class 15a	67	86	19	65	70	—5	42	48	6	2.2	11.6	.63
Class 15b	61	80	19	62	76	14	48	59	11			.5
Class 30	71	85	14	67	67	0	42	60	18	1	9.7	.6
School B—40	72	91	19	62	70	8	51	56	5	1.6	8.8	.5
School C—80												
Class 52	67	98	29	63	73	10	47	68	21	2.24	11.2	1.
Class 50	58	75	17	65	62	—3	30	40	10			
School D—36	55	80	25	64	58	—6	34	40	6			
												Fl. To. Ers. 5

7TH GRADE—190 PUPILS

SCHOOL AND CLASS							ELEMENTARY PUNCTUATION			FULL PUNCTUATION		
School A—70												
Class 12	70	85	15	67	67	0	42	63	21	44	55	11
Class 13	75	90	15	67	70	3	40	63	23	42	52	10
School C—80												
Class 48	60	80	20	58	79	19	37	44	7			
Class 49	65	85	20	64	79	15	42	53	11			
School E—40	64	85	21	61	64	3	30	54	24	30	40	10

9TH GRADE—80 PUPILS

School A—80												
Class 17	85	95	10	64	73	9	48	60	12	48	58	10
Class 19	85	98	13	79	82	3	63	80	17	66	66	0
Class 20a	80	90	10	75	76	1	69	73	4	56	68	12
Class 20b	75	95	20	66	82	16	60	70	10	54	64	10

Class 52 had been formed by taking the more advanced portion of a larger group of which Class 50 was the inferior portion, and this advanced class had five periods a week for grammar and punctuation instead of three, and five full periods

APPENDIX

a week for letter writing. The teacher of grammar and punctuation and the teacher of letter writing were particularly capable. The scores show the expected result. This class alone was able to correct its letters fully, so that a score on total errors on the final test could be made. All the test letters of the system were marked for the opening test by the author.

Observe that Class 52, though taught by one of the most capable teachers in the school system, and composed of picked pupils, was at the start little higher on this test of applied knowledge than other classes.

Practically no work was supposed to be done on advanced grammar between the opening and final tests, but some teachers did not observe this rule and there is an offsetting deficiency in punctuation, as for example in the case of Classes 48 and 49, handled by the same teacher who conducted the letter writing for Class 52. In three instances the final test in advanced grammar shows a loss of several points. The tests at Racine on advanced grammar run more nearly parallel, as the teachers were kept more uniformly on the same work; yet in a few cases the second test shows a loss. This indicates the unavoidable accidental variation in conditions and results in individual classes, though the averages at Racine confirm the parallel value of the second test.

The improvement in arithmetic at Racine was found by adding up all the errors made in any problems in each class on the first test, then doing the same on the second test, making a correction in the second total in proportion to the increase or diminution of the average speed of the class so that we should be dealing with number of errors in the same number of examples done, and then seeing what percentage of the first total the difference between the two was. The average improvement was 34 per cent, and it appeared to be the same at Gary, where improvement was calculated by a slightly different method.

Failure to improve seemed to be due to lack of intensive effort by the teacher at the right mental point. In some cases the teacher would go through all the motions in arithmetic, yet, for lack of mental pressure, no improvement in accuracy would

APPENDIX

result. It has also been apparent that pupils fail to increase their speed in typewriting term after term for lack of this mental pressure on the part of the teacher. In English, on the other hand, going through the routine produces more or less improvement in all classes, though teachers who bring the right mental pressure to bear get distinctly better results; for instance, as did the teachers at Gary who handled Classes 52, 12, and 13, and 48 and 49. On the other hand, the very capable teacher who handled the class in school B failed to get results in punctuation because she kept the emphasis on memorizing rules instead of on practice, while the teacher who handled Class 30 got excellent results in punctuation though inferior results in grammar, being an elocution teacher accustomed to develop emphasis through the voice, though unfamiliar with methods of teaching language (this was her first language class in many years). The teacher who handled Class 15b at Gary was a biology teacher who had not taught language for years, but being a very capable teacher in handling young people so as to make them work, she got superior results in both elementary and advanced grammar.

At Racine, the most capable teachers were those handling Classes 1 and 2 at one school and Classes 19 and 20 at another school. The relative improvement is shown roughly by the percentage in arithmetic. They started highest and made most gain. When 100 per cent was reached, the class ceased to be measured. This meant that more than half the class made a perfect score, but the errors of the other half of the class would have brought the arithmetical average down. At Gary, Class 52 showed two thirds of its members making 100 per cent, but the errors of the other third brought the average down to 95 per cent, and so a score of 98 per cent was assigned arbitrarily as fairest.

This tends to prove that the top of the scale (near 100 per cent) is not harder to advance on than the lower parts, though averaging all the lower classes with all the higher it would be seen that there is an appreciable advantage in the lower ranges as marked by points of advancement. Low-grade classes have more opportunities for improvement than those near the top, and so there is a slightly greater chance for them to score by picking the easier ones.

APPENDIX

IMPROVEMENT IN SPELLING, GRAMMAR, AND PUNCTUATION AFTER FIVE WEEKS OF DRILL, SPRING, 1917, MEASURED BY NATIONAL BUSINESS ABILITY TESTS

*300 Pupils in 8th Grade, Gary. Superintendent William Wirt
Supervision Mr. Cody, books in hands of pupils*

<i>Elem. Spelling</i>	<i>Elem. Gram.</i>	<i>Adv. Gram.</i>	<i>Elem. Punctuation</i>
Opening Test <u>77%</u>	Opening <u>63 %</u>	Opening <u>64%</u>	Opening <u>45%</u>
Final Test <u>92%</u>	Final <u>85.6%</u>	Final <u>68%</u>	Final <u>63%</u>
Improvement <u>15</u>	Improv. <u>22.6</u>	Improv. <u>4</u>	Improv. <u>18</u>
Class drill 12 hrs.	Drill 8 hrs.	No drill	Drill 8 hrs.

300 Pupils in 7th Grade, Gary

<i>Elem. Spelling</i>	<i>Elem. Gram.</i>	<i>Adv. Gram.</i>	<i>Elem. Punctuation</i>
Opening Test <u>73%</u>	Opening <u>67%</u>	Opening <u>63%</u>	Opening <u>38%</u>
Final Test <u>91%</u>	Final <u>85%</u>	Final <u>72%</u>	Final <u>55%</u>
Improvement <u>18</u>	Improv. <u>18</u>	Improv. <u>9</u>	Improv. <u>17</u>
Class drill 12 hrs.	Drill 8 hrs.	Little drill	Drill 8 hrs.

*500 Pupils, 8th Grade, Racine. Superintendent B. E. Nelson
Supervision Mr. Cody, only teachers had books*

<i>Elem. Spelling</i>	<i>Elem. Gram.</i>	<i>Adv. Gram.</i>	<i>Elem. Punctuation</i>
Opening Test <u>91.5%</u>	Opening <u>80 %</u>	Opening <u>73%</u>	Opening <u>62 %</u>
Final Test <u>96.8%</u>	Final <u>93.6%</u>	Final <u>73%</u>	Final <u>74.6%</u>
Improvement <u>5.3</u>	Improv. <u>13.6</u>	Improv. <u>0</u>	Improv. <u>12.6</u>
Class drill 8 hrs.	Class drill 5 hrs.	No drill	Drill 8 hrs.

500 Pupils, 7th Grade, Racine

<i>Elem. Spelling</i>	<i>Elem. Gram.</i>	<i>Adv. Gram.</i>	<i>Elem. Punctuation</i>
Opening Test <u>84.8%</u>	Opening <u>70 %</u>	Opening <u>67%</u>	Opening <u>55 %</u>
Final Test <u>93 %</u>	Final <u>89.5%</u>	Final <u>70%</u>	Final <u>61.6%</u>
Improvement <u>8.2</u>	Improv. <u>19.5</u>	Improv. <u>3</u>	Improv. <u>6.6</u>
Class drill 8 hrs.	Drill 5 hrs.	No drill	Drill 8 hrs.

Total errors in letter writing in Gary and Racine reduced 40% to 50%, total errors in arithmetic reduced 34%.

N.B. Notice that 7th grade makes relatively more improvement than 8th grade, and both far more in the short time given than the

APPENDIX

original difference between the 7th and 8th grades, the result of one year of ordinary work. Parallel results on advanced grammar, where no drill was given, prove equality of two test papers. Home study about doubled the time stated.

36 Pupils in 8th Grade, Doyle School, Flint, Michigan Following written directions, books in hands of pupils

<i>Elem. Spelling</i>	<i>Elem. Gram.</i>	<i>Adv. Gram.</i>	<i>Full Punctuation</i>
Opening Test 82%	Opening 81%	Opening 76%	Opening 66%
Final Test 96.3%	Final 93%	Final 81%	Final 85%
Improvement 14.3	Improv. 14	Improv. 5	Improv. 19
Class drill 14 hrs.	Drill 14 hrs.	No drill	Drill 14 hrs.

Errors in letter writing reduced 50%, in arithmetic 53.1%, in 14 hrs.

APPENDIX

NEW YORK CITY

AVERAGES OF SCHOOLS IN DR. STITT'S DISTRICT

8th Grade before Drills — December 12, 1917

The National Averages here given were obtained by giving tests to carefully selected representative groups in such leading business houses in different parts of the country as the National Cash Register Co., Burroughs Adding Machine Co., Sears, Roebuck & Co., Marshall Field & Co., Commonwealth Edison Co., National Cloak & Suit Co., and Filene's (Boston). They are the averages for grammar-school graduates who had been passed by the employment managers, graduates of commercial departments of high schools tested at the schools, and experienced employees in these houses, such as first-class stenographers.

NATIONAL AVERAGES	ELEM. GRAM.		ADV. GRAM.		ELEM. PUNC.		FULL PUNC.	
Beginners (Gram. Sch.) .	72.5				65		60	
High-School Grads. . .	81		77		78		74	
Experienced Employees .			85				74	
	8A	8B	8A	8B	8A	8B	8A	8B
Public School A . . .	82.5	85	71.5	74.5	68.5	67	63	62
Public School B . . .	70	75	66	74	59	69	53	58
Public School C . . .	73	79	69	73	66	66	58	61
Public School D . . .	80	85	73	73	70	90	72	84
Public School E . . .	77.5	86	71.5	74.5	59.5	67	50.5	61
{ Public School F Ac. .	74	70	63	68	63	64	59	61
{ Public School G P V .	61	63.5	64	66	46	49	47	45
Public School H . . .	85	85	77	74.5	63.5	71.5	59	65
Public School I . . .	77.5	80	70	71.5	74	76.5	69.5	69
Public School J . . .	82	88.5	74	80.5	73	81.5	73	78.5
{ Public School K B . .	72.5	71	74	68	69	63	65	57
{ Public School L G . .	72	74	62	68	53	65	40	60
District Averages . . .	75.4	78.5	70	72.1	63.4	69.1	59.8	63.6

APPENDIX

Class B was a half year ahead of Class A. Comparison shows the ordinary improvement in one semester.

Classes were rated by taking the median or middle grade, but school records were made by averaging classes.

When elementary tests show no higher than advanced, it is apparent that the teacher has made no effort to give first attention to the points of practice most commonly used. Apart from the cases of one or two schools brought down by some one inferior class, equality of grades in A and B classes indicates emphasis on theoretical work rather than on practical command of tools.

National Averages above are from grades made by persons who had never seen these tests before. When a second test is given after special drill upon the practical working tools here tested, comparison is made with records of schools which have taken drill, and by comparison with these figures the improvement of each class is measured.

NEW YORK CITY — BROOKLYN

ARITHMETIC AVERAGES ON NATIONAL TESTS IN DR. VEIT'S DISTRICT

8th Grade after Drill and Two Courtis Tests — December 18, 1917

Speed in arithmetic comes readily with practice; and in the routine of business, those who handle figures soon develop such high speed that comparison with school speeds is not of interest. The important thing in the eyes of the business man is the percentage of accuracy, and a moderately low speed with high accuracy is satisfactory. First-class bookkeeping departments show an unavoidable human error of about 1 per cent (verified by these tests), to correct which all work is refigured by checkers and then refigured in the auditing department. At least half the expense in accounting is to eliminate the 1 per cent of unavoidable error.

The following shows speed averages of ordinary grammar-school graduates and graduates of commercial departments of high schools who have not had special drill on rapid calculation, together with the average number of errors; and then it shows

APPENDIX

the estimated number of errors (B. Ers.) that satisfactory accountants would have made in doing the same number of problems regardless of the time it would have taken. "Speed" is the count of figures in all answers right and wrong, and "Errors" is the count of figures wrong.

NATIONAL AVERAGES	ADDITION			SUBTRACTION			MULTIPLICATION			TOTAL		
	Sp.	Ers.	B Ers.	Sp.	Ers.	B Ers.	Sp.	Ers.	B Ers.	Sp.	Ers.	B Ers.
Gram.-School Grads.	10	1.3	.33	32	1.8	.3	22	2	.5	64	5.1	1.1
High-School Grads.	15	1.3	.5	51	1.2	.5	46	2	1	112	4.5	2

A AND B CLASSES IN 16 BROOKLYN SCHOOLS — GRAPH PAGE 195

Public School A Cl. A	15	.75	55.5	1.25	33.5	1	104	3
A — B	17	1	61	1.25	34.5		112	3.65
Public School B — A	16	1.7	69	1.33	36	1.7	121	4.75
B — B	19	1.33	69	1.66	39	1.33	127	4.33
Public School C — A	17	1.33	61	1.4	33	1.17	111	3.9
C — B	17	2	64	1.7	35	1	116	4.7
Public School D — A	16	1.5	54.5	2	30	2	100	5.2
D — B	17	1	61	1.5	33.5	1.5	111.5	4
Public School E — A	15	1.7	53	1.7	30	2	98	4.4
E — B	15	1.35	51	1.33	31	1.8	97	4.46
Public School F — A	15	1.25	43.5	1.5	25.5	1	83	3.75
F — B	14	1	54.5	1	31	1.5	99	3.5
Public School G — A	15.7	1.4	57	1.75	31	2.1	103.7	5.25
G — B	16	1	58	1.3	32	1.3	106	3.6
Public School H — A	16.5	1.5	69	1.5	38.5	1.4	124	4.4
H — B	16.5	1.5	65	1.5	38	1.5	119.5	4.5
Public School I — A	16	1.25	67.5	1.5	39.5	1.8	122	4.5
I — B	16	.5	67	1.5	37	.5	120	2.5
Public School J — A	22	2.5	53	2	30	2	105	6.5
J — B	20	1.5	65	1.5	37	2	122	5
Public School K — A	15	.66	55	1	28	1.2	98	2.86
K — B	14.5	1.25	53	1.25	31.5	1	98	3.5
Public School L — A	20	1.25	68	1.88	37.5	1.8	125.5	4.93
L — B	19	1.33	68.5	2	38	2	117.5	5.33
Public School M — A	16	1	48	1	37	1.5	101	3.5
M — B	13	0	40	1	24	1	77	2
Public School N — A	16	1	62	1.5	34	1.7	112	4.2
N — B	16	1.25	65.5	2.25	38.5	1.5	120	5
Public School O — A	17	1.66	70	2	39	2.33	126	6
O — B	21	1.66	75	2	39	2.33	135	6
Public School P — A	16	.9	59	1.1	29	1.1	104	3.1
P — B	18	1.1	71	1.75	40	1.6	129	4.45
Dist. Av. of Cl. A	16.4	1.4	58.4	1.53	33.2	1.61	108.7	4.4
Dist. Av. of Cl. B	17.75	1.17	61.8	1.53	35	1.45	112.9	4.1

APPENDIX

COMPARISON OF COURTIS WITH NATIONAL RECORDS ON 4000 PUPILS IN BROOKLYN

June-December, 1917

Addition

	SPEED			ACCURACY		
	COURTIS	NATIONAL	DIFF.	COURTIS	NATIONAL	DIFF.
CL. A	13.9	16.4	2.5	75%	65.85	9.15
B	14.6	17.75	3.15	78	73.63	4.37

Subtraction

CL. A	13.9	14.6	.7	87	79.12	7.88
B	14.7	15.2	.5	87	79.21	7.79

Multiplication

CL. A	11.8	11.07	-.73	80	70	10.
B	13.2	11.7	-1.5	81	75.2	5.8

Courtis Tests were given in June, National in December. The Courtis record of problems attempted is here changed to count of figures for the proportion of time used in National Tests, but the record of accuracy used in the National Tests is changed to Courtis percentages.

The Subtraction record is probably nearest to normal and least affected by change of habits since June, 1917. The National method of grading by counting figures wrong instead of problems wrong, reduced to the Courtis plan, is obviously about 10 per cent more severe than counting problems wrong.

In Addition, copying problems obviously takes slightly less time than adding them up. So that in Addition the speed score for the National Tests is about 15 per cent higher than for the Courtis Tests.

APPENDIX

The National method of counting all figures in answers and single wrong figures, instead of wrong problems where one figure wrong counts as the entire eight in the problem, is evidently fairer and nearer to business practice. The business standard is 99 per cent of accuracy. On the National Tests we can get the standard of accuracy most directly from the Subtraction test, where each figure represents a single operation as business men count them. The average in this Brooklyn district for Class A in Subtraction was Speed 58.4 and Errors 1.53, a percentage of accuracy of 97.38; for Class B, Speed was 61.8 and Errors 1.53, giving a percentage of accuracy of 97.5. This would be acceptable to business men for beginners.

National records are changed to Courtis for comparison as follows: In Addition, problems are copied, which takes about as much time as adding them, so that about one fourth as many problems are handled as in the Courtis Test of 8 minutes. There are four figures in each answer, so the National speed in figures is the same as the Courtis speed in problems; but the errors should be multiplied by four, as under the Courtis plan one error in the answer to a problem would make the whole answer of four figures wrong. In Subtraction, the time is merely cut in half, so we double the speed record and double the errors. Then as there are eight figures in the answer, we divide the doubled speed by eight, while the errors stand as they are. The same applies to multiplication. As the National Test occupies but three minutes, while the Courtis Test occupies six, we double the speed and errors, and divide the National speed by six, the number of figures in the answers. There still remains the excess in number of errors due to counting figures instead of problems, corrected by deducting 10 per cent from the count of errors.

Comparison of speed in Subtraction indicates that in the second half of the Courtis Test the speed is only slightly reduced, if at all, as probably this class has gained slightly in speed in six months. In Addition and Multiplication there has obviously been more improvement in Class B than in Class A, and the figures cannot be used as a safe basis for comparison.

INDEX

- Abuse of standard tests, 49.
- Accuracy and speed, significance of, 32.
- Accuracy on fundamentals as vocational equipment, 6.
- Addition, test on, 88, 91.
- Addresses, writing, 36.
- Addressing envelopes, test on, 167.
- Alertness, mental, 57.
- Alphabetizing, 36, 169.
- Alpha series, U. S. army tests, 22.
- Answering letters, 41; test on, 142.
- Appendix, 203.
- Arithmetic, tests on fundamental, 86; tests on business, 97; objections to school problems, 40.
- Army tests, United States, 23.
- Army trade tests, 30.

- Blank, form for tabulating arithmetic, 87.
- Bookkeeping, 39; invoicing as test of, 70.
- Brooklyn, report of tests, 211.
- Bulletin No. 1, National tests, 14.
- Bulletins Nos. 2, 3, and 4, National tests, 17.
- Business, needs of high school the same as, 2; educational tests in, 81.
- Business Ability Tests, National, 10; two series, 56.
- Business men, how they judge applicants, 4; coöperation between educators and, 7.
- Business practice tests, 36.

- Certificate for teachers, 50.
- Changing help, cost of, 5.
- Chicago, problem considered in, 1.
- Classroom, National tests in, 43.
- Courts tests, shortened arithmetic, 88; comparison with National, 213.

- Distribution of frequencies, 192.

- Educational tests, in business, 31; and intelligence, 188.
- Educators and business men, co-operation between, 7.
- Efficiency increased by standard measurements, 5.
- Employment register, how prepared, 196.
- English, tests on, 106.
- Envelopes, test on addressing, 167.
- Errors and percentage, count of, 183.

- Fairness of National tests, 43.
- Filing or alphabetizing, 36; test on, 167.
- Five, scale of, 187.
- Fractions, tests on, 97, 98.
- Frequencies, distribution of, 192.
- Fundamentals, accuracy on, as vocational equipment, 6.

- Gary, report of tests on language, 205.
- General clerks, preparation of, 3.
- General directions for giving tests, 56.
- Grading by pupils, feasibility of, 43.
- Grading tests, 178.
- Grammar, 35; tests on, 112; elementary tests, 114, 117; advanced tests, 115, 117.
- Graphs, 194, 195.
- Groves, J. W., report of, 202.

- Habit, measure of intelligence under influence of, 31.
- High schools, the needs of business the same as, 2.
- Hundred per cent standard, 18.

- Improvement, measuring, 52, 189.
- Improvement after drill, table of, 208.
- Inspection of papers, 180.
- Instructions, reproducing, 33; test on, 63.
- Intelligence, educational tests and, 188.
- Intelligence tests, psychological, 21.
- Interpreting results, 185.